THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXIV. No. 1630.] LONDON, AUGUST 7, 1894. [46TH YEAR. PRICE 6d.

GAS AND WATER PIPES

1¼ to 12 IN. BORE.

THOMAS ALLAN & SONS,
Bon Lea Foundry,
SOUTH STOCKTON-ON-TEES.

ALSO MANUFACTURERS OF
SANITARY & RAIN-WATER PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.

GLASGOW OFFICE: 24, GEORGE SQUARE.
Telegrams:
"BONLEA, STOCKTON-ON-TEES."
"SPRINGBANK, GLASGOW."

— ESTABLISHED 1830. —
PARKER & LESTER,
Manufacturers & Contractors.

THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores for Gas and Water Works.

WORKS:
ORMSIDE STREET, OLD KENT ROAD, LONDON.

WOLSTON'S
TORBAY PAINTS
Special Quotations to Gas Companies.
DARTMOUTH, DEVON.

Lanemark Coal Co.,
LIMITED.

LANEMARK CANNEL AND GAS COALS.

Quotations and Analysis on application to

LANEMARK COLLIERY,
NEW CUMNOCK, N.B.

Shipping Ports: All the principal Scotch Ports.

THE "C" BURNER.
NEW HIGH-POWER GAS-LIGHT.
INCANDESCENT GAS-LIGHT SYSTEM.

Consumes 3¾ cubic feet per hour.

Gives a light of 70 to 80 candle power.

Brilliant Light.

Perfectly Steady and Noiseless.

Smokeless.

Reduced Heat.

The Ordinary Burner, with Special Globes, is suitable for Lighting Private Houses, Public Houses, Restaurants, Shops, &c.

Special Lamps constructed for Outside Lighting and Street Lighting; and Large Clusters of Lights made for Lighting Halls and large Areas from one centre.

Can be attached to any Gas-Fittings.

THE TRIUMPH OF GAS OVER ELECTRIC LIGHT.

Taking Gas at 3s. per 1000 cubic feet and Electric Light at 8d. per Board of Trade unit, the "C" Burner will produce an equal amount of light at **One-eighth the cost of Electric Light.** This cannot be disproved.

Substantial and Pushing Sole Agents wanted in each Town using Gas.

For Terms and Particulars, apply to the Manager of

THE INCANDESCENT GAS-LIGHT COMPANY, Ltd.,
14, PALMER STREET, WESTMINSTER, LONDON,
Near St. James's Park Station.

CASH PREPAYMENT METERS.

THE "POSITIVE" PREPAYMENT-SLOT-METER.

Noted for Strength and Simplicity of Construction.

Used by many Corporations and Gas Companies.

Material and Workmanship of the best.

Prices and full Particulars on application.

SAWER & PURVES, MANCHESTER.

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 feet of 19-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.
Telegrams: "ATLAS SHEFFIELD."

INCLINED RETORTS,

FIRE BRICKS,
LUMPS, TILES,
BLOCKS, &c.

Special Bricks for Intense Heats.

GAS RETORTS.

CASTINGS AND EVERY REQUISITE FOR GAS-WORKS.

MOBBERLEY & PERRY,

Fire-Brick Works, STOURBRIDGE.

Retort Setters sent to any part of the Kingdom.

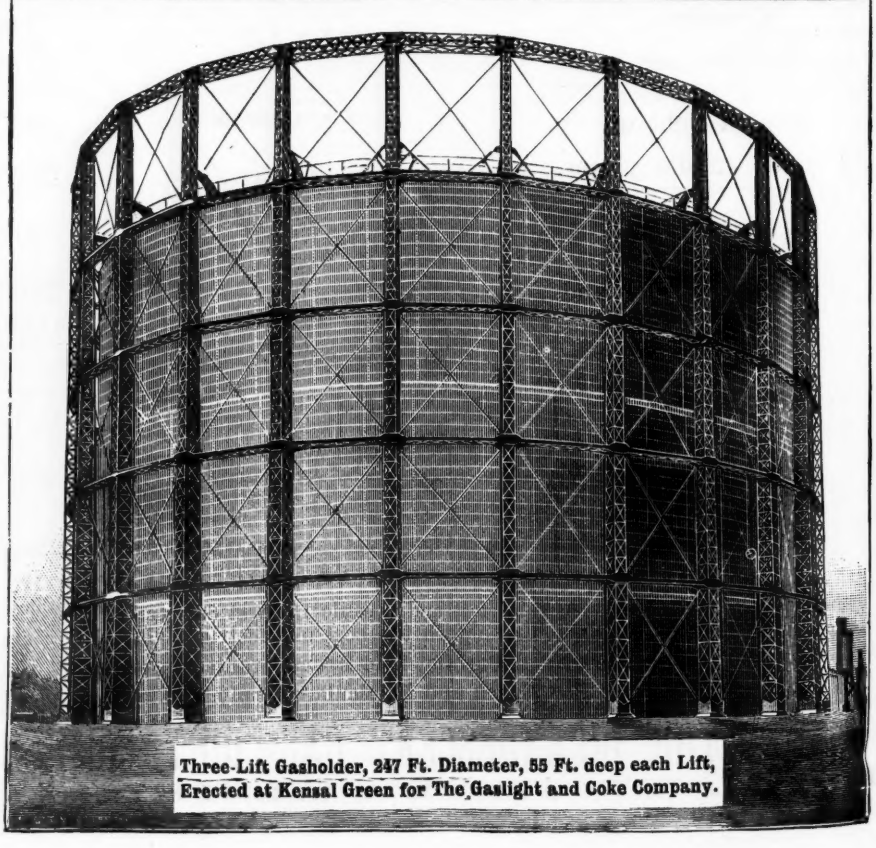
SAML. CUTLER & SONS, MILLWALL, LONDON.

NEARLY

8 MILLION

CUBIC FEET

CAPACITY.



Three-Lift Gasholder, 247 Ft. Diameter, 55 Ft. deep each Lift, Erected at Kensal Green for The Gaslight and Coke Company.

THE BARROWFIELD IRON-WORKS, LIMITED,

Late LAIDLAW, SONS, & CAINE, Limited,

GAS ENGINEERS AND CONTRACTORS,

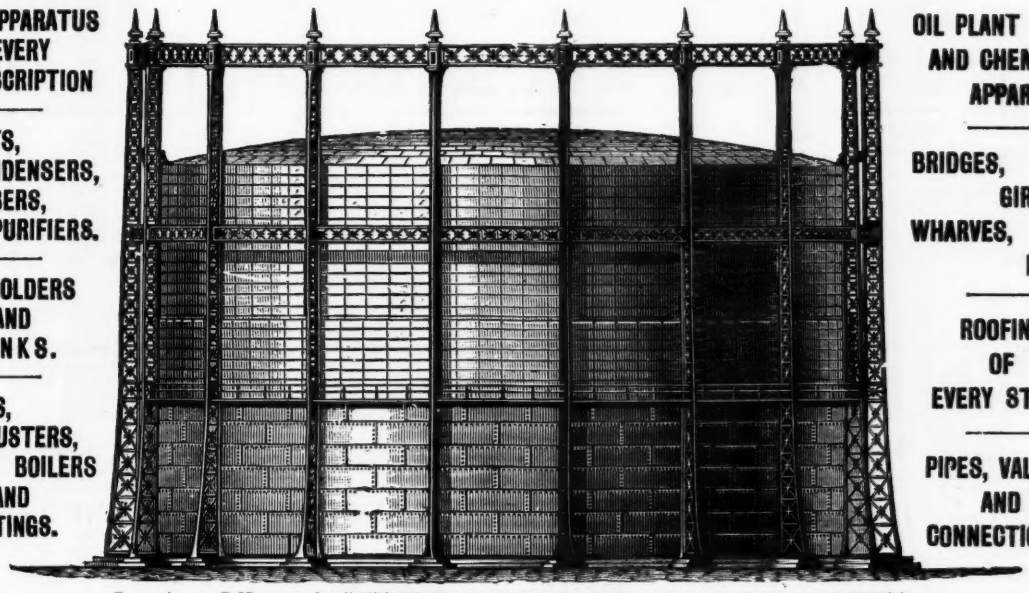
Telegrams: "GASOMETER GLASGOW." GLASGOW.

GAS APPARATUS OF EVERY DESCRIPTION

RETORTS, CONDENSERS, SCRUBBERS, PURIFIERS.

GASHOLDERS AND TANKS.

ENGINES, EXHAUSTERS, STEAM BOILERS AND FITTINGS.



OIL PLANT AND CHEMICAL APPARATUS.

BRIDGES, GIRDERS, WHARVES, PIERS.

ROOFING OF EVERY STYLE.

PIPES, VALVES, AND CONNECTIONS.

London Office: 6, LITTLE BUSH LANE, CANNON STREET.

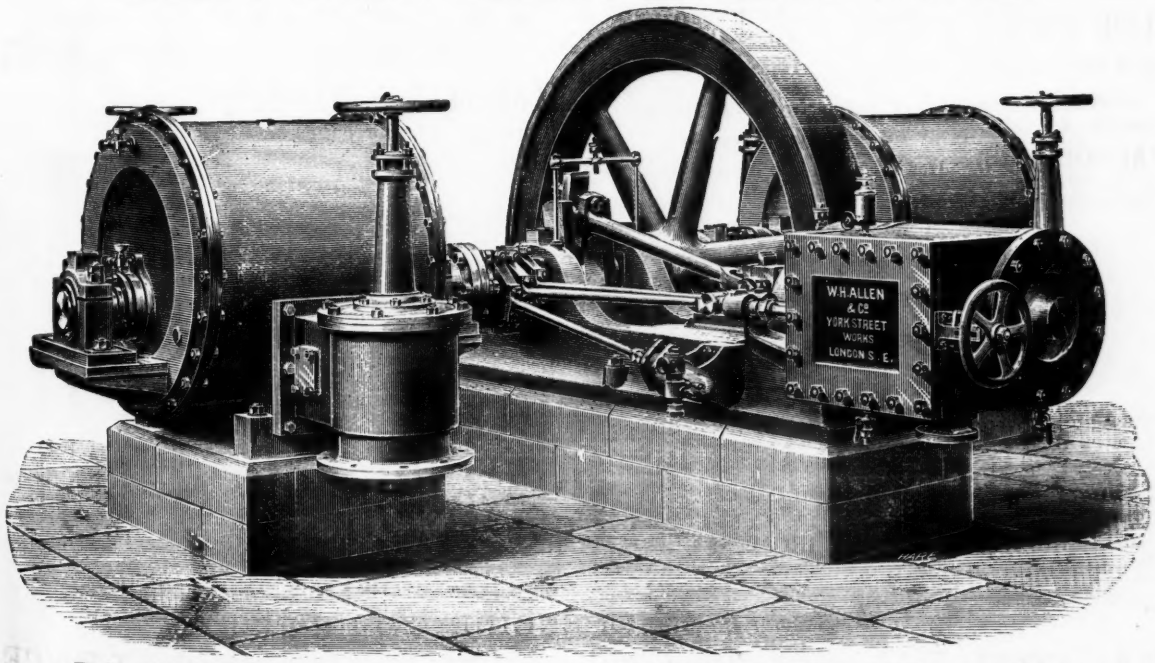
W. H. ALLEN & CO.,

York Street Works, LAMBETH, LONDON, S.E.,

MAKERS OF THE MOST IMPROVED FORM OF

GAS EXHAUSTING MACHINERY.

BEALE'S PATENT—ALLEN'S COMBINED SYSTEM.

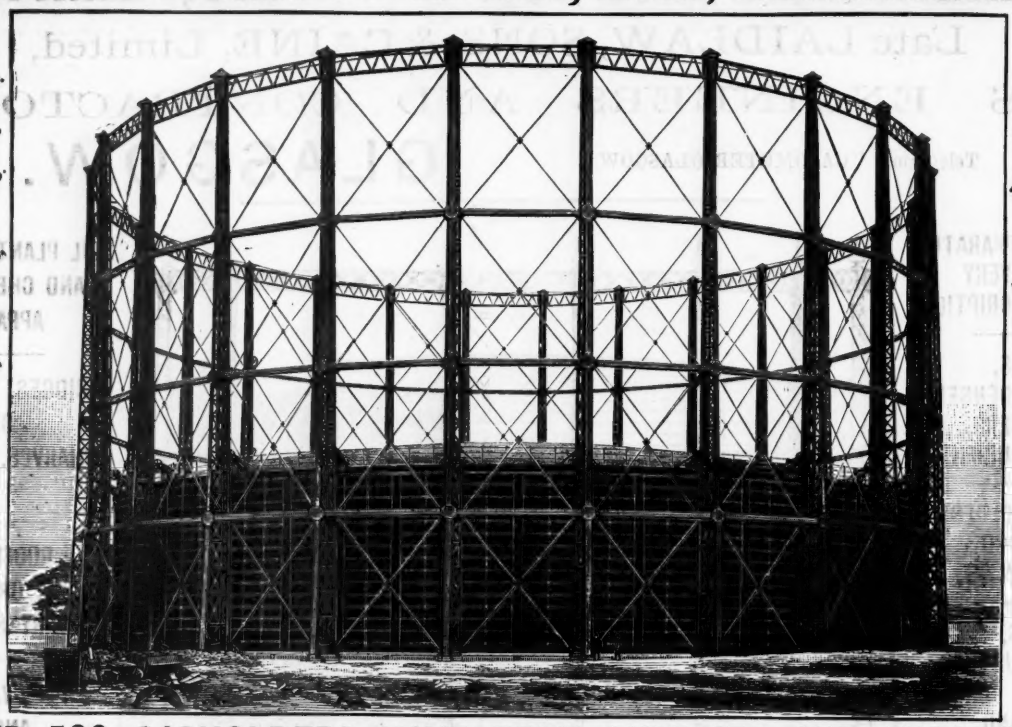


Pair of Non-Oscillating Exhausters, passing 200,000 Cubic Feet of Gas per Hour.

THOMAS PIGGOTT & CO., LTD., BIRMINGHAM.

LONDON OFFICE: ST. THOMAS APOSTLE, E.C.

GAS PLANTS, BOILERS, ENGINES, PUMPS, ROOFS, RETORT FITTINGS, ETC.



TELEGRAPHIC ADDRESS: ATLAS, BIRMINGHAM.

WELDED & RIVETED PIPES, FOUL MAINS, RETORT LIDS, WROT & CAST TANKS, PURIFIERS.

OVER 500 GASHOLDERS HAVE BEEN SUPPLIED AND ERECTED,

INCLUDING THOSE SUPPLIED TO THE FOLLOWING GAS COMPANIES AND CORPORATIONS:

BATH.	BOLTON.	BRISTOL.	CHELTENHAM.	LEAMINGTON.	PRESTON.	SHEFFIELD.
BELFAST.	BOMBAY.	BRISBANE.	HARTLEPOOL.	LIVERPOOL.	READING.	STOCKHOLM.
BECKTON.	BRADFORD.	CARDIFF.	LEEDS.	NOTTINGHAM.	RIO GRANDE.	SYDNEY.
BIRMINGHAM.	BRIGHTON.	COVENTRY.	LEICESTER.	OLDHAM.	SOUTH METRON	VIENNA.

GAS COAL.

BEST

REAL OLD SILKSTONE GAS COAL,

Address THE STRAFFORD COLLIERIES COMPANY,

Near BARNSLEY, SOUTH YORKSHIRE.

NEWTON, CHAMBERS, & CO., LIMITED,

THORNCLIFFE IRON-WORKS, near SHEFFIELD,

MANUFACTURERS OF

SLIDE VALVES, WITH RACK & PINION OR Internal or External SCREWS of all sizes.

GASHOLDERS, AND Gasholder Tanks.

CAST-IRON RETORTS,

RETORT-BED FITTINGS,

And Retort-House Appliances

of every description,

Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.

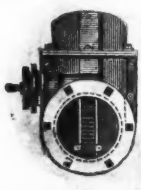
WROUGHT AND CAST IRON CONDENSERS, SCRUBBERS, & WASHERS,

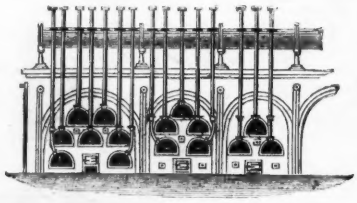
TAR AND LIQUOR PUMPS, &c.

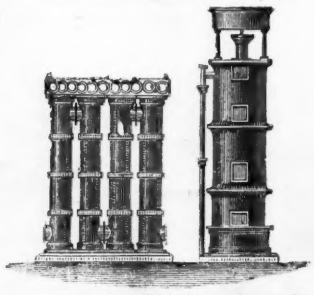
PATENT CENTRE-VALVES

for working Purifiers,

Also Bye-Pass & Stop Valves.





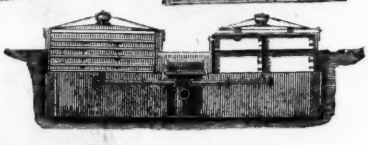


PURIFIERS with Planed Joints,

HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS.

WOOD GRIDS.

CAST AND WROUGHT IRON TANKS AND CISTERNS.



DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

Telegraphic: "Fortress, Donnington, Salop."

C. & W. WALKER,

Telegraphic: "Fortress, London."

MIDLAND IRON-WORKS, DONNINGTON, NEAR NEWPORT, SHROPSHIRE.

London Office: 10, FINSBURY SQUARE.

PURIFIERS with Planed Joints.

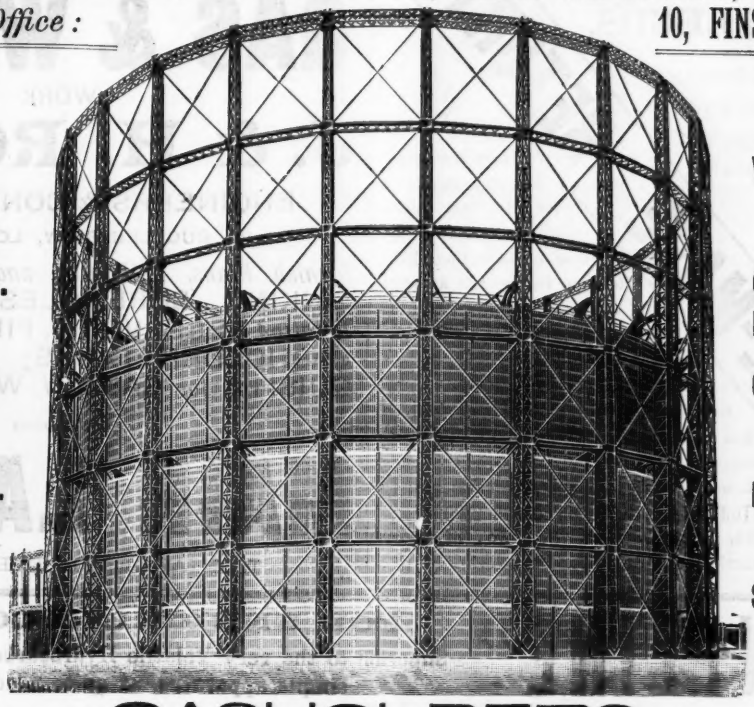
TOWER SCRUBBERS.

PURIFYING-MACHINES FOR AMMONIA.

CONDENSERS.

TAR PLANT.

SULPHATE OF AMMONIA PLANT.



WASHERS.

WASHER-SCRUBBERS.

CLAUS' SULPHUR-RECOVERY PLANT.

CENTRE & FOUR-WAY VALVES.

RETORT-MOUTHPIECES.

SLIDE-VALVES, TAR-BURNERS, SIEVES, &c., &c., &c.

GASHOLDERS.

The above is a view of the largest Gasholder (four-lift) of The Gaslight and Coke Company, Beckton, containing 8 million cubic feet, erected by us in 1892.

Sole Makers of **WECK'S** Patent CENTRE-VALVE, & **CRIPPS'** Patent HYDRAULIC MAIN VALVE.

THE AUTOMATIC GAS-METER CO., LTD.,

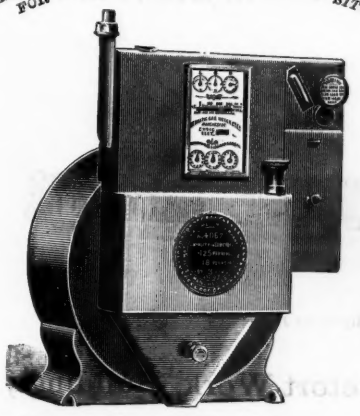
UPPER BROOK ST., MANCHESTER.

SOLE PROPRIETORS OF

THORP, MARSH, AND HAYNES' PATENTS.

PENNY-IN-THE-SLOT GAS-METERS.

THE AMOUNT OF GAS GIVEN IN EXCHANGE FOR COIN CAN BE ALTERED *IN SITU.*



The persistent efforts of the Inventors of our Meters have been crowned with

SUCCESS.

There can be no two opinions on the question of the priority of our claim to the consideration of Gas Companies as *the First* Introducers, on a Practical Scale, of a Penny-in-the-Slot Meter.

THE AMOUNT OF CASH PLACED IN THE BOX IS RECORDED. THIS IS A COMPLETE CHECK AGAINST FRAUD.

PENNY-IN-THE-SLOT GAS-METERS.

So long ago as 1889, we advertised our Penny-in-the-Slot Meters as having the now fully-recognized advantage of ability to alter IN SITU the amount of Gas given per Coin. Automatic Meters without Coin-Counting Index are liable to be tampered with.

PRICES AND FULL INFORMATION FROM

LONDON: ALBERT BUILDINGS, 49, QUEEN VICTORIA ST., E.C.

MANCHESTER: UPPER BROOK STREET.

LEEDS: 5, MERRION STREET.

JOSEPH CLIFF & SONS,

INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,
WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:
Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

TELEGRAPHIC ADDRESS:
"ROBUSTNESS LONDON."

GAS & WATER WORK

J. & H. ROBUS,

ENGINEERS & CONTRACTORS,
20, BUCKLERSBURY, LONDON, E.C.,

furnish Plans, Estimates, and Specifications for SINKING BOREHOLES *and* WELLS; *Erecting* RESERVOIRS, FILTER-BEDS, *and* GASHOLDER TANKS; *and* EVERY REQUISITE *for* GAS *and* WATER WORKS,

INCLUDING

MAIN LAYING

EXCHANGE TELEPHONE 1756.

"CANNELINE"

FOR ENRICHING COAL GAS.

Superior to the very Volatile Hydrocarbons; requiring only a simple apparatus, at quite a nominal cost.

Coal Gas can be enriched by "CANNELINE," in our specially designed plant, at a cost of ¾d. per Candle, showing conclusively its vast superiority over all other Enriching Agents, including Cannel Coal.

For all particulars, apply to

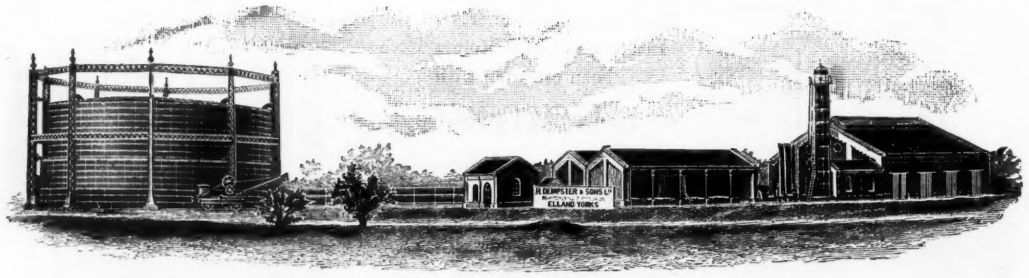
S. BOWLEY & SON, Wellington Works, BATTERSEA BRIDGE, LONDON.

R. DEMPSTER & SONS, L.D.

GAS ENGINEERS AND CONTRACTORS,

ELLAND, YORKS.

Established 1855. **Telegrams: DEMPSTER, ELLAND.**



Engraved from Photograph of Complete Works erected by us in 1893.

The whole of the Apparatus, Foundations, Retort-Work, Buildings, and Levelling of Site have been executed by our men, without Sub-Contracts.

Estimates and Illustrations for complete Works, or for any detailed parts, supplied gratis on application.

Tenders given for all kinds of Structural Ironwork.

WEST'S GAS IMPROVEMENT COMPANY, LTD.,

ALBION IRON-WORKS, MILES PLATTING, MANCHESTER.

AND

104, Queen Victoria St.,

LONDON, E.C.

WEST'S

MANUAL

AND

POWER

MACHINERY

FOR

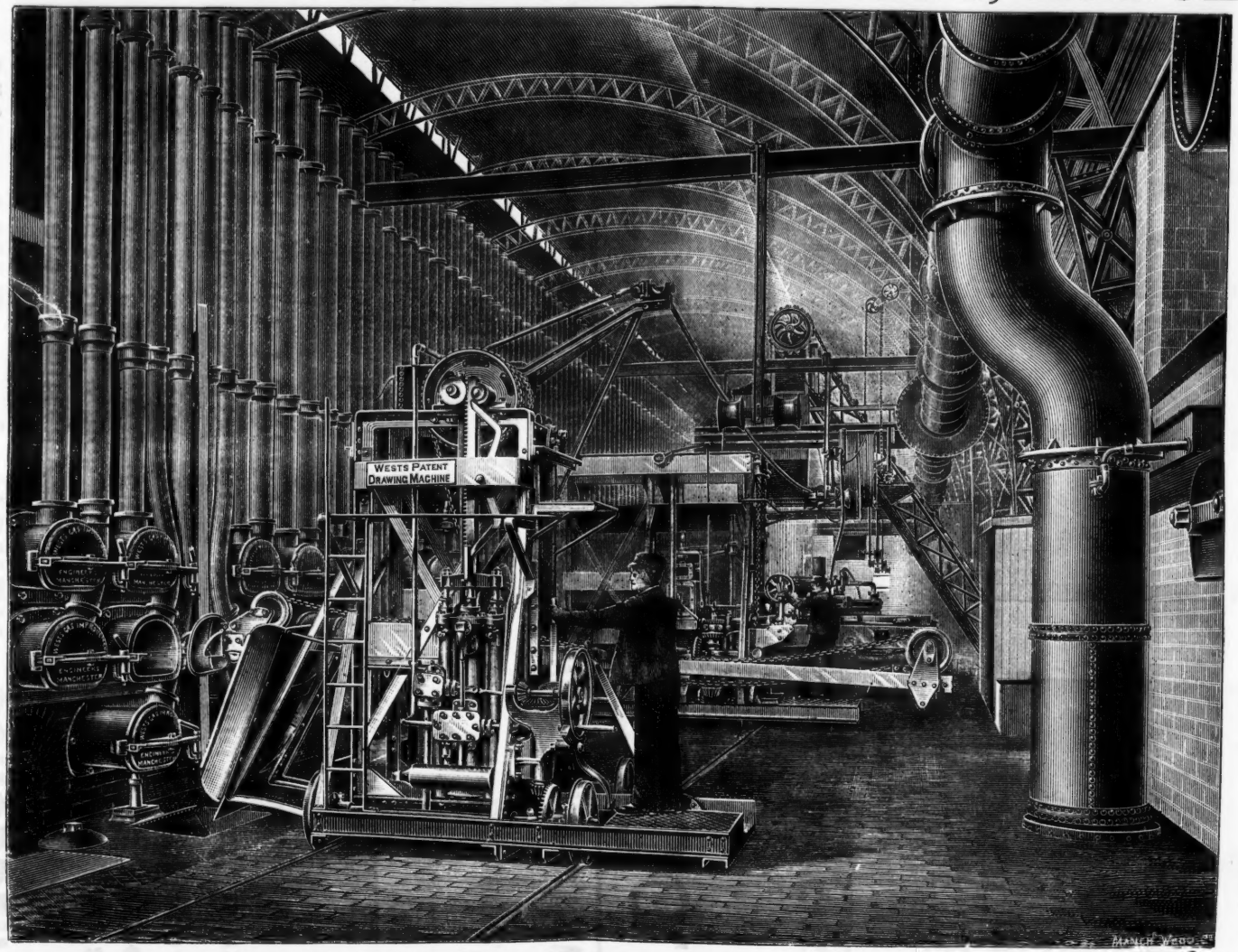
CHARGING

AND

DRAWING

GAS-

RETORTS.



Interior of Retort-House at the Bradford Road Gas-Works, Manchester, showing the Compressed-Air Drawing and Charging Machines.

AND

104, Queen Victoria St.,

LONDON, E.C.

OVER

560,000

LINEAL

FEET

OF

RETORTS

DAILY

ARE CHARGED

AND DRAWN BY

WEST'S

MACHINES.

KIRKHAM, HULETT, & CHANDLER'S,

PATENT LIMITED,

"STANDARD" WASHER-SCRUBBERS

These Machines are admittedly the most efficient of any in the Market, as evidence of which the fact is stated that 478 of them, equal to a daily capacity of 461,972,000 cubic feet of Gas, are in operation or in course of construction.

Maximum Efficiency. Minimum Wear and Tear, Back Pressure, and Power required to drive.

Machines recently erected at Beckton, Devonport, Dorking, and Accrington, and in hand for Antwerp, Silvertown, Berlin, Marlborough (U.S.A.), &c.

Sole Agents in Gt. Britain for Marshall's Patent Tar-Extractor.

3 & 4, PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER, S.W.

GEORGE ORME & Co.,

ATLAS METER WORKS, OLDHAM.

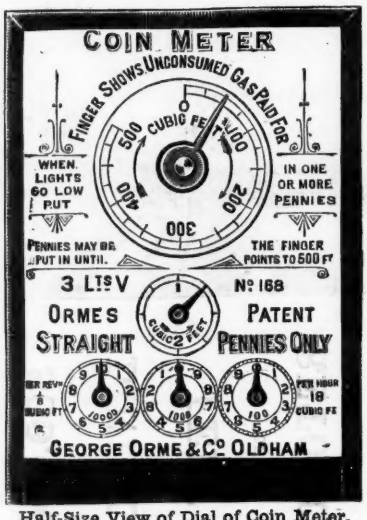
ORME'S PATENT COIN PREPAYMENT METERS.

Wet Meters in Cast-Iron and Tinplate Cases. Dry Meters in Tinplate Cases.

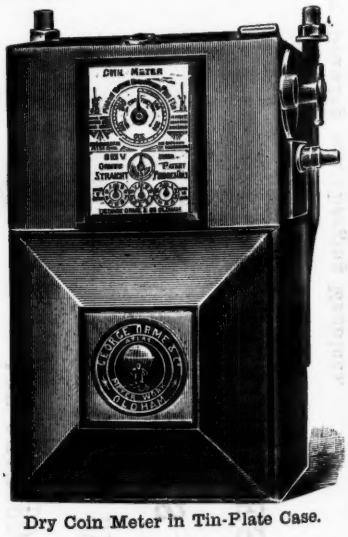
NEW PATENTED ARRANGEMENT FOR ALTERING THE SELLING PRICE OF GAS.

Full Particulars sent upon Application.

Wet Coin Meter in Tin-Plate Case.


COIN METER
FINGER SHOWS UNCONSUMED GAS PAID FOR
WHEN LIGHTS GO LOW PUT
IN ONE OR MORE PENNIES
PENNIES MAY BE PUT IN UNTIL
THE FINGER POINTS TO 500 FT
3 LIGHT
No 168
ORME'S STRAIGHT
PATENT PENNIES ONLY
GEORGE ORME & Co OLDHAM

Half-Size View of Dial of Coin Meter.

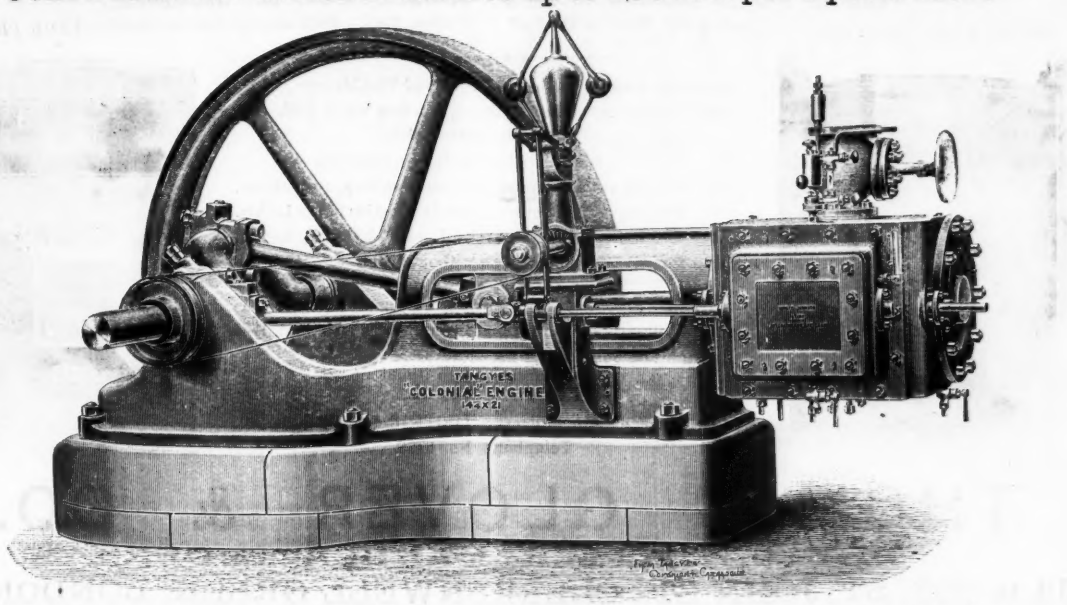


Dry Coin Meter in Tin-Plate Case.

Telegraphic Address: "ORME, OLDHAM." A.B.C. Code (4th Edition) used. National Telephone: No. 93, Oldham.

TANGYES'
"COLONIAL" STEAM-ENGINE

Constructed for Steam Pressures up to 100 lbs. per square inch.



Tangyes' "Colonial" Steam-Engine, with the TANGYE-JOHNSON PATENT AUTOMATIC CUT-OFF GEAR. From a Photograph of the 14½ in. by 1 in. size.

PRICES QUOTED ON RECEIPT OF THE NECESSARY DATA.

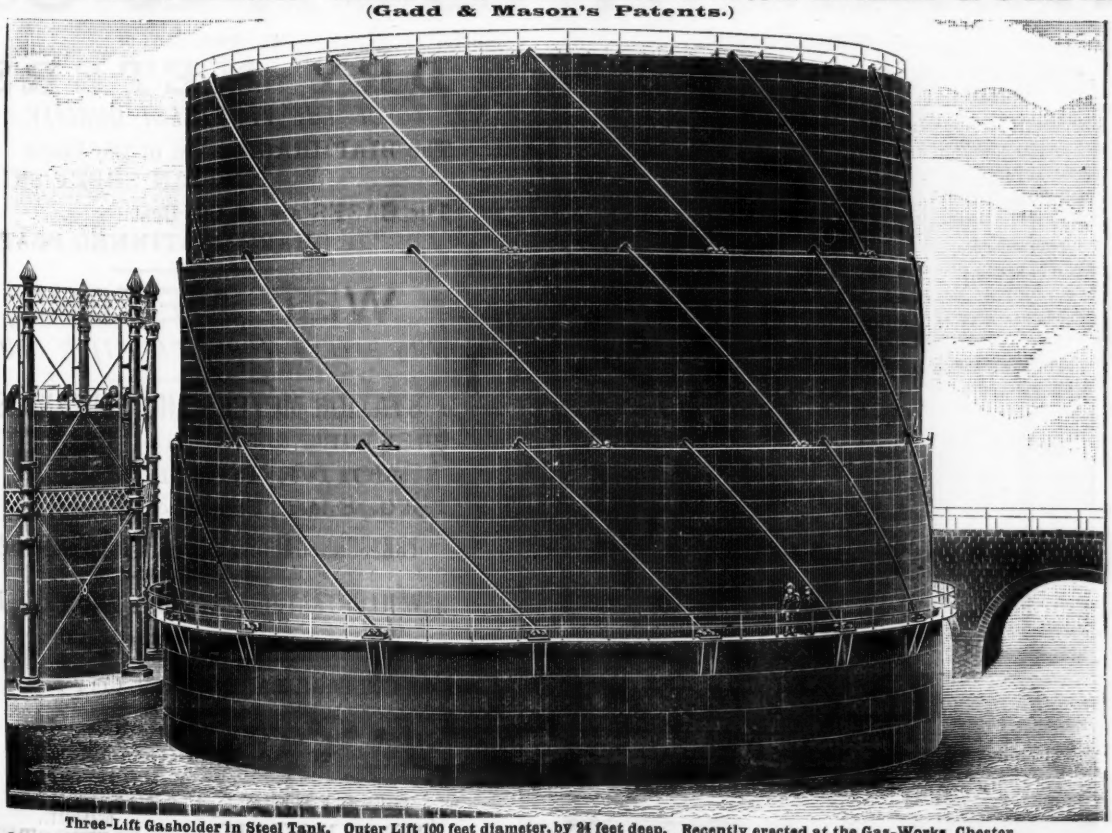
TANGYES LIMITED, Cornwall Works, BIRMINGHAM.

AND LONDON, NEWCASTLE, MANCHESTER, GLASGOW, SYDNEY, MELBOURNE, JOHANNESBURG, BILBAO, ROTTERDAM AND CALCUTTA.

Telegrams: "TANGYES BIRMINGHAM." *Copyright. Entered at Stationers' Hall. No. 69 E.*

COLUMNLESS GASHOLDERS WITH SPIRAL GUIDES

(Gadd & Mason's Patents.)



Three-Lift Gasholder in Steel Tank. Outer Lift 100 feet diameter, by 24 feet deep. Recently erected at the Gas-Works, Chester.

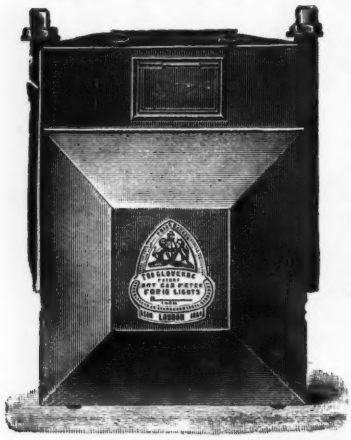
FOR SPECIFICATIONS AND ESTIMATES, WRITE TO **R. & J. DEMPSTER, LTD.**

Newton Heath, MANCHESTER. London Office: 181, Gresham House, Old Broad Street, E.C.

[ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

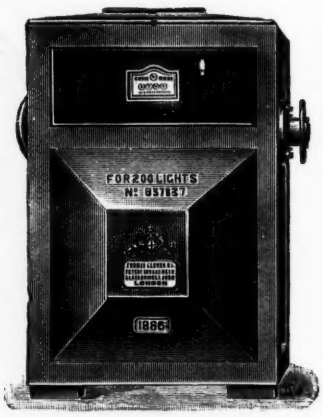
THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;
The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.



1st.—Are a remedy for all the defects of Wet Meters.
2nd.—Are suitable for all Climates, whether hot or cold.
3rd.—Incur no loss of Gas by Evaporation.
4th.—Cannot become fixed by Frost, however severe.
5th.—Are the most accurate and unvarying measurers of Gas.
6th.—Prevent jumping or unexpected extinction of the Lights.
7th.—May be fixed either above or below the level of the Lights.
8th.—Cannot be tampered with without visibly damaging the outer case.
9th.—Will last much longer than Wet Meters.
10th.—Will not cost more than one-half for repair that Wet or Water Meters do.

Are upheld for five years without charge.

Telegraphic Address: "GOTHIC LONDON."
Telephone No. 6725.



THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

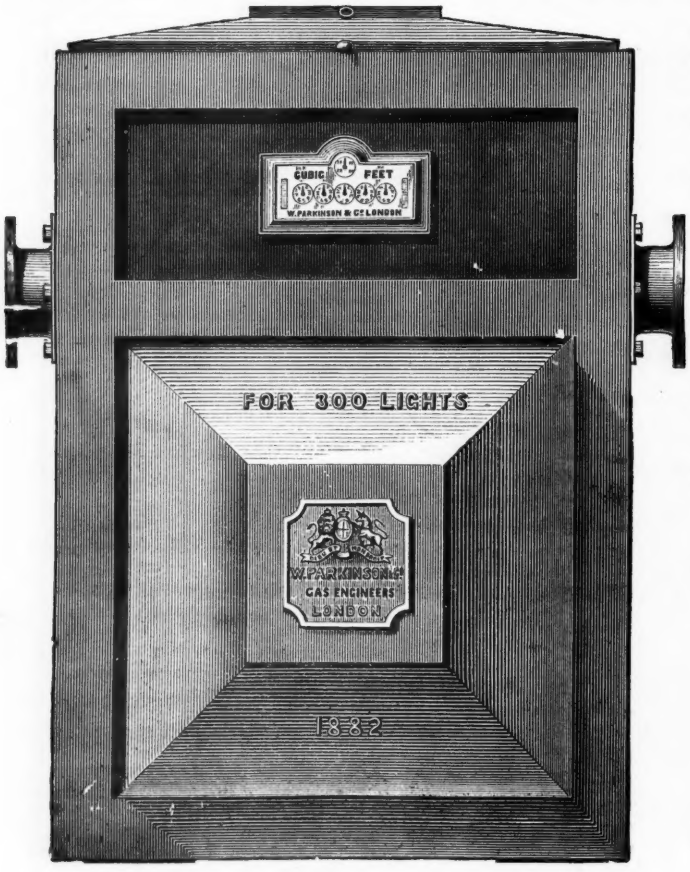
BRISTOL: 62, VICTORIA STREET. *Telegraphic Address: "GOTHIC."*

BIRMINGHAM: 3, BRIDGE ROW, DERITEND. *Telegraphic Address: "GOTHIC."*

LEEDS: BOAR LANE CHAMBERS, 4, BASINGHALL STREET, *Telegraphic Address: "GOTHIC."*

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address: "GOTHIC."*

W. PARKINSON & Co.



MANUFACTURERS OF

DRY METERS

OF THE VERY BEST QUALITY.

The DIAPHRAGMS are of the Finest PERSIAN SHEEP SKINS.

The CASES are of the Best CHARCOAL-TINNED PLATES.

WET METERS,

With PATENT THREE-PARTITION DRUMS.

STATION METERS AND GOVERNORS.
PRESSURE & EXHAUST REGISTERS,
MOTIVE POWER METERS,
Test Gasholders, Experimental Apparatus, &c.
PRESSURE GAUGES OF EVERY DESCRIPTION.

NEW ILLUSTRATED CATALOGUE AND PRICE LIST
Sent post free on application.

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegraphic Address: "GAS METERS."

10, MAWSON'S CHAMBERS, DEANSGATE.
MANCHESTER.
Telegraphic Address: "PRECISION."
[See also Advt., p. 308.

CONTENTS.

EDITORIAL NOTES:—

GAS, LIGHTING, &c.— PAGE

The Chartered Meeting—An Acrimonious Discussion 271
The South Metropolitan Report 272
The Duke of Devonshire at the Old Kent Road 272
Sir Frederick Bramwell Justified 273

ESSAYS, COMMENTARIES, AND REVIEWS:—

Gas and Water Companies in the Stock Market 273
Electric Lighting Memoranda 273
Fifty Years of Gas Manufacture: A Retrospect (*Conclusion*) 274

TECHNICAL RECORD:—

German Association of Gas and Water Engineers—Lecture by Herr W. von Oechelhaeuser on the Gas Industry in the United States 275
North British Association of Gas Managers—Annual Meeting in Glasgow—Discussions—
Mr. Ballantyne's Paper (1893) on "Cooking by Gas" 277
Mr. Yuill's Paper on "Enriching Coal Gas from Oils by the Peebles Process at the Alloa Gas-Works" 278
Pacific Coast Gas Association 281
Objections to the Arrangement of Apparatus for Working in Parallel in Gas-Works 281
The Manchester Electric Lighting System 282

CORRESPONDENCE:—

The Discussion on Mr. Chester's Paper on Regenerator Firing 283
Mr. M'Gilchrist's Presidential Address 283
Illuminating Power and Illuminating Effect 283
Hirschfeld's Patent 284

PARLIAMENTARY INTELLIGENCE:—

Progress of Bills 284

LEGAL INTELLIGENCE:—

High Court of Justice—Chancery Division—
In re the Barcelona (Besos) Water Company 284
Attorney-General *v.* Vestry of Camberwell; The Bath Question . . . 284

MISCELLANEOUS:—

Meeting of The Gaslight and Coke Company 285
South Metropolitan Gas Company—The Half-Yearly Report and Accounts 289
Meeting of the Brentford Gas Company 289
Provincial Gas and Water Companies 290
Edinburgh and Leith Gas Commission—Adoption of the Peebles Process; The Annual Accounts 292
Electric Lighting at Hanley 293
Mr. John Burns, M.P., on the Organization of Gas Workers 293
The Examinations in "Gas Manufacture"—The Question Papers . . . 293
Notes from Scotland 294
Current Sales of Gas Products 294
Coal Trade Reports 295
Gas and Water Companies' Stock and Share List 295

PARAGRAPHS.—Death of Mr. J. Gibb, of Armagh, 273—Death of Mr. J. Lewis, 273—The Retirement of the Birmingham Water Engineer, 275—North of Ireland Association of Gas Managers, 275—The Competing Gas Supply for New York City, 275—The Plymouth Gas Bill as Settled, 275—The Flow of Gas in Pipes, 280—The Strength of Brick Arches, 280—Iron and Steel Institute, 280—Presentations to Mr. T. de Courcy Meade, 283—An Extraordinary Sample of Water, 283—The Monier System of Construction, 283—The London County Council and the Water Question, 284—Liverpool Water Supply, 288—Rotherham Water Supply, 293—Exhibition of Gas Appliances at Greenock, 294—Gas Explosion at Blackpool, 294—Extension of the Dewsbury and Heckmondwike Water-Works, 294—The Price of Gas in London, 295—Fire at the South Metropolitan Gas-Works, 295—Sales of Shares, 295—The Rotherham Corporation and their Coal Contracts, 295—The Boughton Blean Gas and Coke Company, Limited, 296—The Maintenance of Incandescent Gas-Lights, 296—Newport (Salop) Water Supply, 296—Stourbridge Gas Supply, 296.

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

Telegraphic Address: "GASKING LONDON."

Telephone Number: 2759.

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 7, 1894.

The Chartered Meeting—An Acrimonious Discussion.

THE meeting of the proprietors of The Gaslight and Coke Company on Friday last was not very largely attended. This was to be regretted, as it was made the occasion of another "round" in the protracted battle between the Horseferry Road autocracy and Mr. George Livesey; and it was therefore interesting beyond the ordinary run of such functions. Before discussing this, the most salient feature of the meeting, it is, however, due to the Governor—Colonel Makins—to pay some attention to the less contentious portions of the speech in which he moved the adoption of the report and accounts. The first matter that calls for comment in this part of the Governor's address is the admission that the Directors have reconsidered their attitude in regard to the introduction of the prepayment meter system, and have decided, although without much hope of good results, to try the plan. The next important statement from the Chair had reference to the question of meter-rents; and the Governor took the opportunity of offering to abolish this charge if the other Metropolitan Gas Companies would do the same. This offer, if it meant anything at all, must be interpreted as a direct response to the clamourings of the latest batch of London gas agitators, which scarcely accords with the Governor's indignant protest, in another part of his speech, against the idea that the Directors are susceptible to "outside pressure." Colonel Makins was able to give a good account of the state and tendency of the market for gas residuals; and he stated that the Company had had for the past half year the luxury of paying a smaller net price for their coal than has been marked at any previous era of their existence. This being so, it seems a pity that the Directors could not have foreseen the favourable result of their half-year's operations in time to have announced a considerable reduction in the price of gas a little sooner than they did, which would have gone greatly in their favour with the public. It is true, as we remarked a fortnight ago, that the tide of the Company's affairs has turned "in the nick of time;" but the mere fact that such tremendous oscillations should be possible in their revenue returns is quite enough to encourage the agitators to persevere in their attacks. Of course, it can all be explained. It is a strong feature of the new Chartered management that everything connected with the undertaking can be explained by figures to the hundredth part of a penny. But the Directors should remember, as one of the proprietors told them on Friday, that there is nothing so misleading as figures; and there is more than a little danger of the Governor being choked, some time or other, by the statistical fireworks which the Management puts into his unaccustomed mouth. To tell the truth, Colonel Makins is never happy when repeating statistics. He is not at home with them, and frequently mis-states them in a fashion to make the reporters groan. As a dialectician he is excellent; and he can misunderstand an opponent, and refute what has *not* been said, as skilfully as any *habitué* of St. Stephen's. He is, moreover, good at general expressions of confidence in The Gaslight and Coke Company, and of indignation with its "irresponsible critics." But in arithmetic he is unimpressive.

Not once, but twice, in the course of Friday's proceedings, Colonel Makins undertook to explain, for the benefit of the critics of the Company, the nature and operation of the sliding-scale; and if he did not succeed in demolishing in this way the inconsiderate Mr. James Rowlands, M.P., and the somewhat too ubiquitous Sir A. Rollit, M.P., to say nothing of Mr. Naoroji, M.P., the fault was not in the endeavour. All these observations and explanations, however, served mainly to lead up to the great effort of the Governor's speech—his formal challenge to Mr. George Livesey to make good the disparagement of the Chartered management which the South Metropolitan Chairman uttered at the last meeting of his Company, as reported in the JOURNAL for Feb. 20 last. It suited Colonel Makins to refer to these observations of Mr. Livesey as an uncalled-for attack upon the Chartered management. But, as a matter of fact—as Mr. Livesey was careful to point out when his turn came—the onus for starting a comparison between the circumstances of the two undertakings rests with the compiler of the Memorandum read by the Governor at the meeting last February. Colonel Makins chose to assume on Friday that this astonishing computation, which we characterized at the time as a *tour de force* in accountancy, stands unchallenged and uncontradicted; but a reference to the issue of the JOURNAL already cited will not support this view of the case. Doubtless, the computation was a work of art of very considerable merit, from the point of view of an accountant; but, unfortunately for the case they were to support, the figures came at least seven years too late. If Mr. Livesey is in error in questioning the business capacity of the Chartered administration, he is a sinner of long standing; for the issue of the JOURNAL for Feb. 15, 1887, contains, in our report of a Chartered meeting, some remarks of his upon this subject that go behind and beneath the figures of the document on which Colonel Makins relies with such touching confidence.

There is, however, no pleasure to be derived from the contemplation of the animosity that has now all too long marked the mutual relations of the Chartered and South Metropolitan Companies, to their several and joint detriment. The Chartered Board may have been weak just

where the South Metropolitan administration is strong; and things may have been done under their lax rule which many among their own shareholders never intended and cannot applaud. Companies, after all, are composed of individuals; and some individuals have an unfortunate knack of irritating others. It was a sad mistake that set the two chief London Gas Companies at loggerheads afresh in 1890, when there was more than a chance that matters might have been re-established between them on a more amicable footing. But we must leave readers of our report of Friday's proceedings (in another column) to judge where the responsibility for this regrettable result rests.

The South Metropolitan Report.

THE report of the Directors of the South Metropolitan Gas Company for the half year ending June 30 last, with the accounts for this period, will be found in another column. The Directors begin their statement by referring to their action in reducing the price of gas as from Lady-day to 2s. 4d. per 1000 cubic feet, which they explain as having been due to their expectation of increased profit upon the year's trading, notwithstanding the advanced cost of coal. Last year's coal contracts were made upon terms very favourable to the Company; and residuals have turned out exceptionally well. There has been, moreover, a peculiarly satisfactory increase of gas consumption in the Company's district, equal to $5\frac{3}{4}$ per cent. over the corresponding half of 1893; and in recounting the influences that have contributed to place the undertaking in its present prosperous condition, the Directors do not omit to make mention of "the praiseworthy devo- "tion of all the principal officers to the Company's inte- "rests, seconded, as it is, by the cheerful spirit in which the "subordinate officers and workmen, with few exceptions, "do their duty." There has been a remarkable increase in the number of consumers and of gas-stoves during the year from June, 1893, to June, 1894. The total number of consumers rose during this period from 86,875 to 102,411; and that of gas-stoves let on hire, from 21,600 to 29,705. It is satisfactory to know that the classes of ordinary consumers and stoves have furnished more than their usual quota to this growth of the business; but the bulk of it is admittedly due to the demand by working people for prepayment meters and small cooking-stoves. It is something astonishing that in less than two years over 19,000 of this fresh class of gas consumers have been obtained by the Company; and the applications still continue to pour in at the rate of 300 weekly. This kind of business can hardly be so profitable as the ordinary consumption; but yet we are informed that the average requirement of those using the automatic prepayment meters for lighting purposes only is 12,000 cubic feet per annum, and considerably more where a small cooking-stove is also used. Hence the South Metropolitan Directors have every reason to be satisfied with the immediate result of their new departure in this direction; while the prospective and consequential effects of this popularization of gas cannot yet be ascertained, but can hardly fail to be beneficial to the undertaking generally.

Two other principal topics are briefly dealt with in the report—the working of the profit-sharing system, and the facilities extended to consumers and workmen for making investments in the Company's stock. Four years' experience of the former has led the Directors to increase the percentage of annual bonus, on the condition that one-half of the total bonus shall be invested in the Company's ordinary stock, with the object of giving the employees a greater interest in the concern. From the necessarily curt style in which this announcement is made, it might conceivably be argued, by a disbeliever in the system in question, that the Board have found it advisable to raise the premium upon the faithful service which it is claimed to encourage. We do not suppose that the Directors mean their action to be interpreted in this manner; but the point is one which the Chairman would be well advised to deal with more fully at the meeting on the 15th inst. As regards the popularization of investment in the Company's stock, the report declares that their policy in this respect has brought into marked prominence the objections and difficulties attending the issue of a nominal 13 per cent. stock at such a high premium that the investor gets only about 5 per cent. upon his money. It is quite understandable that people who wish to invest small amounts in gas property entertain a great objection to giving (say) £13 in cash for £5 of stock; and not only this class of capitalists, but also others of greater means, will not pay so high a relative price for such stock as they would do if the nominal dividends were lower, and more nearly corresponded with the return actually received. The Company, in short, lose an appreciable proportion of premium by the scale on which they are at present compelled to compute their dividends. This points, as the report shows, to the desirability of converting the nominal 10 per cent. stocks of the Company into equivalent amounts of 5 per cent. consolidated stock; but nothing is said about any intention on the part of the Directors to initiate the necessary steps for bringing the change to pass.

With regard to the dividend, the report states that, although the price of gas entitles the shareholders to $13\frac{1}{2}$ per cent., the Directors do not recommend any increase, but propose that the same dividend as before (13 per cent.) should be paid. The surplus profit that would otherwise go to increase the dividend is to be applied in strengthening the reserve fund, which has been seriously depleted during the past five years; in adding £10,679 to the insurance fund, which has been similarly treated; and the remainder will go to bring up the undivided balance to £27,954, which cannot be considered excessive. Thus the undertaking, as the result of one favourable year's operations, has been restored to something like the financial position it occupied prior to the manifold troubles and vicissitudes which began in 1889; while the price of gas has been reduced to within 1d. per 1000 cubic feet of the lowest figure at which it has ever been sold in the district. Such a result speaks for itself.

The Duke of Devonshire in the Old Kent Road.

PROFIT-SHARING DAY at the South Metropolitan Gas-Works was this year rendered more than usually memorable, in the estimation of the newspapers, by the presence at, and the participation in, the proceedings, of the Duke of Devonshire, who, in his position as President of the Royal Commission on Labour, has made, so to speak, the strawberry leaves of his coronet bear an accompaniment of fruit for the refreshment of the working community. The proceedings were reported in our last week's issue; but it remains for us to draw attention to the great service rendered by such celebrations in exhibiting, in a fashion capable of being understood and appreciated by the working classes, the substantial good that a "union of hearts" between employers and employed is capable of effecting for both parties. The Duke of Devonshire has established a really enviable reputatation among the public men of his country and generation for conscientiousness, straightforwardness, and devotion to what he conceives to be his duty; and his address to the South Metropolitan workmen last Saturday week was an excellent example of the way in which good labourers of all social degrees are able to interest and understand each other. At the first blush, there would not appear to be much in common between the Duke of Devonshire—the head of the house of Cavendish, and holder of more titles of honour and distinction than he could probably recount himself off-hand, to say nothing of his wealth—and the humble stokers and "cokeys" whom he addressed on this particular occasion in the homeliest and plainest of their common language. Yet it is unnecessary to go far beneath the surface to discover the source of the sympathy that made the Duke at home in the Old Kent Road, and must have caused the poorest of his audience to feel that here was a man speaking to men concerning things in common between them. The truth is that, whether a man be duke or dustman, millionaire or main-layer, so long as he does his duty in that state of life to which he has been called, there will be more real fellow-feeling between him and any other man of whom the same can be said, than between worthy and unworthy members of the same social order. It is good for such dukes as his Grace of Devonshire to make friends of day labourers; and it is good also for the labourers to have an occasional opportunity of appreciating such qualities as those that traditionally belong to the Cavendishes. Working men who have listened even for once to such an address as that pronounced at the Old Kent Road works on the 28th ult. are not so likely to be carried away by the fustian and windy rubbish that usually constitute the stock-in-trade of the mob-orators of the parks and street corners, as those of their fellows who have never had the

opportunity of comparing the homely eloquence of truth-telling and sober-minded statesmen with what passes too often for popular oratory.

Sir Frederick Bramwell Justified.

It is with some gratification that we are able to congratulate Sir Frederick Bramwell upon having "scored" in his interpretation of the terms upon which the statutory tramways undertakings of the United Kingdom are transferable to the local authorities. There have been occasions in his career when the reasons for Sir Frederick Bramwell's undoubted eminence as an engineering expert and arbitrator have not struck observers as particularly obvious. But this time he must be credited with a clear perception of the rights of the question submitted to his judgment—at least, he has been at one with the House of Lords on the point at issue, which is enough for all practical purposes. The matter has already been mentioned in these columns; and it is therefore unnecessary to explain it at length. Essentially, it is a question of the interpretation to be put upon the terms of purchase by local authorities enacted in the case of tramways constructed under limitation with twenty-one years' exploitation by the licensees. The companies were under the impression that, though they were under compulsion to sell to the local authority, if the latter should elect to purchase at the expiration of their twenty-one years, "upon terms of paying the then value (exclusive of any "allowance for past or future profits of the undertaking, "or any compensation for compulsory sale, or other con-"sideration whatsoever) of the tramway, and all lands, "buildings works, materials, and plant of the promoters "suitable to, and used by them for the purposes of their "undertaking," they nevertheless had a right to be paid upon the valuation of the property as an undertaking—that is, upon a valuation of its profit-earning capabilities. Sir F. Bramwell, however, refused to take into consideration, in the case submitted to him, any other than the structural element of value. He is supported by the House of Lords, who hold that, because the statutory rights of tramway companies are made determinable at a stated period, they have no claim to be paid, at the expiration of this period, as for an undertaking which then no longer exists. All that remains is the structure, plant, &c., and this can be bought for what it is worth—that is, for what it could be replaced for, having regard to depreciation. The judgment is of capital importance to owners of every kind of statutory undertaking with a limit of life. It is curious, all the same, that, if this is what Parliament meant in the instance of the Tramways Act, which was the first of its kind, the word "present" was not inserted between the words "past and future" in the sentence held to be exclusive of all regard for profits. Meanwhile, although it has been decided that a tramway is not to be valued for purchase by a local authority as a hereditament, it is assessed as one, and the proprietors have to pay rates accordingly.

Death of Mr. J. Gibb, of Armagh.—We regret to record the death, on the 25th ult., of Mr. Joseph Gibb, of Armagh. Deceased, who was 88 years old, was instrumental in organizing the Gas Company at Old Cumnock, Ayrshire, of which he was the first Manager. Prior to that he erected a small oil-gas plant, and supplied several of the inhabitants with this kind of light. He removed to Armagh in 1839, and was for 43 years employed by the Gas Company; and they acted most generously towards him on his retirement. For the eleven years before his death, he had enjoyed his well-earned pension. He laid claim to having anticipated the Copp patent mode of working the hydraulic main, and read a paper before the North British Association of Gas Managers about the year 1876; but he did not contend as to his priority of discovery.

Death of Mr. J. Lewis.—After a painful and prolonged illness, Mr. John Lewis, Manager of the Rushden and Higham Ferrers District Gas Company, died on the 29th ult., in his 63rd year. Deceased was born in Flintshire, and acquired his knowledge of gas making at the Chester Gas-Works, where he passed the earlier period of his career. He became Manager of the Higham Ferrers Gas Company 39 years ago, and conducted the undertaking very successfully. Some years later, however, he accepted the management of the Rushden Gas-Works, and carried them on so judiciously that the fortunes of the Company improved materially. Eventually, it may be remembered, the undertakings were amalgamated; and new works were erected, from the designs and under the superintendence of the deceased's eldest son—Mr. J. T. Lewis, of Wellingborough—to supply the district. Mr. Lewis leaves a widow, two sons—one (Mr. H. C. Lewis) being in the Company's service—and seven daughters.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 295.)

Seeing how quiet all the Markets have been for some time past (even when a Bank Holiday and an Autumn vacation were not staring them in the face) it is not to be wondered at that business in the Stock Exchange has been extremely restricted during the week just closed, more especially as that period was docked of a day. But notwithstanding short time and short business, there was scope for some variety; a few incidents cropping up towards the end to break the monotony of depression. Some show of a possibility of disentanglement of that knotty problem, the American Tariff, enlivened the drooping Market; while a pleasant surprise in the Great Western dividend revived things nearer home. Other markets pursued the even tenor of their way. A noteworthy incident in the Money Market, however, has occurred; and being an entirely new departure, it will sufficiently mark an otherwise uneventful week. The joint-stock banks (with the temporary and qualified abstention of that important member, the London and County) have burst another of the Bank of England's leading strings, and have resolved that their rate of interest upon deposits shall no longer be governed by an artificial discount rate. This is a subject upon which more will probably be heard; but it is scarcely within our available space to dilate upon it. The Gas Market has been quite as active as might be expected during the week, and appears still growing in strength; the Metropolitan undertakings again showing in the front of the advance. In Gaslight, good business was done in the "A," which advanced steadily until the closing bargain was marked at 249—the best of the week. Hardly any other issue was dealt in except the "H" 7 per cent. limited, which also scored an advance. Very fair business was done in South Metropolitans, although perhaps more changed hands at the Mart; and the "B" rose a couple of points. A few transactions in Commercials indicated higher prices. The Suburbans and Provincials were quite stagnant, and scarcely a transaction was marked in them. The Continental also were quiet, and wholly devoid of interest; while, of the rest, the only movement was an advance in Oriental. The Water Companies were much neglected; but many issues have risen in value, preference stocks being in special demand.

The daily operations were: Business in Gas was pretty quiet on the opening day; but prices rose. Gaslight "A" gained 1; and Oriental, ¼. Lambeth 7½ per cent. rose 1. Transactions were only moderate on Tuesday; and quotations were steady. Chelsea rose 1. Wednesday's prices in Gas showed steadiness, without any variation. New River rose 2. Thursday was active and buoyant. Commercial old rose 3; ditto new, 2; South Metropolitan "B," 2; Gaslight "H," 2; and ditto "A," 1¼. Friday's transactions were not remarkable; and the only moves were a rise in East London and Lambeth 10 per cents. of 1 each, and of 3 in West Middlesex.

ELECTRIC LIGHTING MEMORANDA.

A Confusion of Ideas—The Fortunes of the Edison and Swan Company—Electric Lighting and Telephoning in the City of London.

A curious example of the arbitrary association of ideas occurred in a London evening newspaper one day last week, in regard to the not particularly thrilling news that the St. Pancras ratepayers have declined to avail themselves of the Public Free Libraries Act, "although most houses were canvassed, and a systematic attempt made to awaken public interest." It appears that St. Pancras is not singular in taking up this position, but that Deptford, with its population of a hundred thousand, has declined for the fourth time to adopt the Act; while polls of the Marylebone ratepayers on the subject have repeatedly failed. This is all very well for Deptford and Marylebone, as we are bidden to believe, because in other respects these parishes are really not so very far "advanced." But the case is different with St. Pancras, because—and here is where the curious association of ideas comes in—this parish has an established reputation for enlightenment, on the score of its having been the first of its class to adopt municipal electric lighting! Was ever a stranger blend, not to say muddle, of ideas? What in the world has the adoption of a particular system of artificial lighting to do with the attitude of the same community, or of their representatives, towards the Free Libraries Act? Yet, after all, there is a left-handed connection between the two things, inasmuch as a body of ratepayers who have been committed by their legal representatives to a speculation in electric lighting of which no man can see the end, may well fight shy of engaging themselves to any other responsibilities whatever. And again, it will be found out before very long, in certain other local government districts besides St. Pancras, that neither a free public library nor a public electric lighting undertaking is an unmixed blessing. Both matters have, in their degrees, established a certain vogue; but the question of their working results in the general interest of the community is far from settled.

At the annual general meeting of the Edison and Swan United Electric Light Company, lately held under the chair-

manship of Mr. J. S. Forbes, it transpired that the Company are doing farly well, notwithstanding the different conditions under which they are now working. Although the patent has expired, the business remains; and there is an enormous advantage, as anyone can perceive, on the side of a commercial concern that can afford to lock up such a sum as £127,000 in lamps, platinum, and materials on the largest scale. Besides, there is a great deal in knowing, as the Edison people have learnt during their years of protected trading, exactly what their different customers require, and how best to satisfy them. Yet it cannot be gainsaid that the irruption of new incandescent lamps into the English market has made a remarkable difference in the prospects of the Edison concern. The Company may sell about the same number of lamps as before—that is to say, they may retain the bulk of their customers—and, as the Chairman claims, they may continue to obtain a price for their wares somewhat in excess of that commanded by their competitors, "because they have got a character as well as a lamp." But there is all the difference in the world between the profit to be made by selling lamps at 3s. 9d. that cost about 9d., and getting rid of the same articles at 1s. 3d. or thereabouts. If the Company are to prosper, they must not only keep their old customers, but must secure new ones; which is a different and far more difficult problem to solve.

A deadlock that has long been a public nuisance was dealt with at the last meeting of the City of London Commissioners of Sewers, when a resolution was agreed to by a sufficient majority which will have the effect of releasing for the public advantage the telephone tubes surreptitiously laid by the City of London Electric Lighting Company. Possibly our use of the term "surreptitiously laid" in regard to these tubes may be objected to by the parties to the transaction in question; but it is beyond dispute that the Electric Lighting Company "stole a march" upon the City authorities, and made provision for telephone wires when they were supposed to be only constructing conduits for electric lighting cables. The consequence of the discovery of this proceeding was, naturally, the refusal by the Commissioners of Sewers of permission for these tubes to be used, unless the user was attended by certain conditions conceived in the public interest. Equally of course, these conditions proved to be impracticable in the commercial sense; and therefore the tubes in dispute, which represent a capital of between £80,000 and £100,000, have remained unused, and while their proprietors suffered, the National Telephone Company have rejoiced. This latter spectacle has been too much for the Commissioners of Sewers; and accordingly, upon the motion of the Chairman of their Streets Committee, they have involuntarily retreated from their position of barren protest against having been deceived, and have set themselves in a new position whence they will be free to act in any sense that may appear expedient. All the same, it is felt that the situation in which the authority has been placed by the action of the Electric Lighting Company is a most undesirable one. If the difficulty should ever be removed in a manner redounding to the profit of the Company, it is be hoped it will be remembered how the advantage has been gained, and all the credit not given to the mere lighting branch of the Company's business.

FIFTY YEARS OF GAS MANUFACTURE: A RETROSPECT.

(*Concluded from p.* 229.)

It is evident, on a merely cursory survey of the condition of gas manufacture fifty years ago, how slight was the acquaintance formed up to then with the groundwork of scientific principles upon which the art is based, and how rudimentary the knowledge of the complicated reactions, chemical and physical, it involved. Such problems, for example, as the effect of the contact of tar with the crude gas, or the nature of the sulphur impurities other than sulphuretted hydrogen, and their removal, had not come within the purview of the gas engineer, still less been met and grappled with. On the other hand, much ingenuity and mechanical skill had been brought to bear in providing the means for carrying out what may be called the elementary operations of gas manufacture and distribution. Thus, while the appliances in use at the time were, when compared with the more elaborate apparatus of the present day, crude and imperfect, they were, in so far as the then state of knowledge allowed, remarkably well adapted to their purpose. When we consider the highly creditable results which the early engineers, such as Clegg, Lowe, and Grafton, were able to show with the slight resources at their command, and with little or no light from scientific research to guide them, a layman may perhaps be pardoned for supposing that the progress made in gas manufacture since their time has not been commensurate with the advance in natural science and the mechanical arts. Those pioneers of the gas profession were, however, somewhat in the position of the cultivators of the rich virgin soil of the prairies. With careful and diligent, if not the most intelligent or wisely instructed culture, a bountiful harvest could not fail to reward their toil; while, as the soil becomes impoverished, through continued and exhaustive working, even with a fuller knowledge of its characteristics and more intelligent adaptability to its requirements, a but feebly corresponding increase in fertility is obtained.

If a considerable advance is observable between the apparatus employed in the production and distribution of gas at the period under review and at the present day, there is a greater gulf between the appliances available, then and now, for the development of its illuminating power. Down to the time when Clegg wrote, little had been done, since the earliest days of gas lighting, to increase the lighting power obtainable from the gas consumed. The batswing and fishtail burners had been invented and some experiments had been made on the regulation of the air supply. Burner tips, both Argand and flat-flame were, however, still made of metal. The evil effects of conduction of heat from the flame by the metal burner, and the desirability of preventing or minimizing such conduction by the employment of non-conducting material, had not been observed; nor was the importance of consuming the gas at the lowest possible pressure, or the gain to be effected by conserving the heat of the flame, yet generally known. (It may be observed parenthetically that it is somewhat remarkable that though the first regenerative burner was patented six years before Clegg's "Treatise" was published, it appears to have been unknown to, or was disregarded by, that author, and indeed the gas profession generally; so that when, many years later, it was revived, it was looked upon as a new invention.) Even the best of the burners available were not generally employed; for Clegg laments that those most used were of the same shape, size, and uneconomical construction as at the commencement of gas lighting. It is not easy to arrive at even an approximate idea of what was the photogenic value of the gas lighting which obtained in Clegg's day. It will no doubt, however, be safe to assume that the Argands, which were the best burners available at the time, did not develop, from ordinary coal gas, an illuminating power of more than 2½ candles per cubic foot, while the flat-flame burners in more general use would barely afford 2 candles; whereas to-day simple Argands, developing 3½ candles, and flat-flame burners 3 candles, are not uncommon, while with regenerative and incandescent burners the duty is increased enormously.

Apart from improvements in mechanical appliances and the economies effected through the larger scale on which the manufacture of gas is now conducted, progress in gas engineering during the last fifty years is chiefly remarkable for the deeper insight which has been obtained, through well-directed research, into the nature of the chemical and physical changes which are concerned in the several operations of gas making, and in its combustion, and the more intelligent adaptability of means to ends thereby rendered possible. Thus, in the retort-furnace, more perfect and consequently more economical, combustion of the fuel has been effected; while, by employing a more moderate chimney draught, the heat obtained is better utilized in the setting. Distillation of the coal in the retort is facilitated, and more valuable results obtained therefrom, by withdrawing the volatile products as quickly as they are produced. A more rational treatment of the crude gas during cooling is observed. The chemistry of the crude gas has been investigated, and the knowledge obtained applied to secure more efficient purification, with fuller utilization of the self-purifying properties of its contained ammonia. In the purifiers themselves, though slaked lime is still employed on perforated trays, as in Clegg's time, the range of operations conducted therein is extended far beyond what was deemed sufficient in those days, and carried out with an intelligent comprehension of the chemical changes involved, such as had not then been conceived. And though, in strictness, not a branch of gas engineering, the development of the riches hidden in the liquid bye-products of gas manufacture, which is entirely an outcome of the last fifty years, may be claimed as a collateral and dependent industry.

With regard to the combustion of gas, if the improvement of burners and the development of the theory of luminous combustion have not always marched hand in hand, an acquaintance with the chemical constitution of gas-flames has undoubtedly led to the more intelligent construction of gas-burning appliances; with the result that an enormous advance has been made in the luminous duty obtainable by the public from the gas consumed. More than this, by the cultivation and better utilization of the peculiar advantages of gas over other fuels, as a source of heat, new industries have been created, and fresh fields of application opened out, such as can hardly have been dreamed of, and had certainly not been clearly foreseen by Clegg and his contemporaries.

We can only dwell briefly upon the economical aspect of our subject. Its dominant feature is the fact that the average price of gas throughout the country is now only about one-fourth of what it was fifty years ago. This notable reduction is not due to a corresponding fall in the cost of the raw material from which gas is made. On the contrary, coal costs more—in most cases considerably more—to-day than it did at the earlier period. Neither can it be ascribed to a great accession of revenue from the development of applications for the bye-products of gas manufacture. For while the liquid residuals may now yield more than they did then, the total return from residuals bears probably, on the whole, a much smaller proportion to the gross outlay for coal. It is to economies effected in the manufacturing operations that the gratifying result is chiefly due. Improved appliances and modes of working have enabled more and better results to be obtained from the distillation, reduced labour, and saved material. One instance must suffice. In a retort-house of the same floor area, much more

than double the quantity of gas is produced now than had been witnessed by Clegg.

With mere mention of another mark of progress, we must draw this essay to a close. A feature which favourably distinguishes modern gas administration from that of the past is the attention now paid to the encouragement of gas consumption. The hiring-out of gas cookers, the holding of gas exhibitions, the introduction of prepayment meters, and the free provision of gas-fittings in the houses of the poor, are quite recent innovations, which have more than justified their introduction by the fillip they have given to consumption of gas. And in the continuance and extension of that policy we have confidence for the future. By advocating improved methods of burning gas, facilitating the acquirement of gas cooking, heating, and lighting appliances, providing means for enabling the poorest to obtain a supply of gas, and otherwise attending to consumers' needs, or anticipating their requirements, the prosperity of gas undertakings will be laid upon a secure foundation, which no competition that has yet appeared will be able to shake.

The Retirement of the Birmingham Water Engineer.—The Birmingham City Council, at their meeting last Tuesday, agreed to the Water Committee's recommendation, referred to last week, that a retiring allowance of £600 per annum should be granted to Mr. J. W. Gray, the Engineer of the Water Department, as from the 1st of January next, on the understanding that, when called upon, he will advise the Committee on any matters connected with the department. The recommendation was strongly opposed by a certain section of the Council; but the various amendments submitted were negatived; and, on a division, the proposition of the Committee was carried by 30 to 25—two of the members being neutral.

North of Ireland Association of Gas Managers.—The annual meeting of the Association will be held in Armagh next Tuesday under the presidency of Mr. C. B. Outon. We learn from the programme issued by the Hon. Secretary (Mr. J. Whimster, of Armagh) that, in addition to the President's address, there will be two papers—one on "A 50-feet Diameter Gasholder, with Specification, Quantities, and Estimate," by Mr. W. B. Featherstone; the other on "The Manufacture of Fire-Clay Gas-Retorts, and the Advantages of having Standard Sizes," by Mr. P. Hurll. There will also be a conversation on "Experiences in Purification." After the meeting, the members will dine together in the Beresford Arms Hotel; and on the following day there will be an excursion (which ladies are invited to join) to Warrenpoint and Rostrevor.

The Competing Gas Supply for New York City.—In the JOURNAL for April 24 last we reproduced from *Progressive Age* an account of the works which the East River Gas Company have erected at Long Island City for the manufacture of gas for the supply of New York. It may be remembered that an important feature of the undertaking was the formation of a tunnel under the East River, to contain the supply-mains. The east and west sections of the tunnel were proceeded with simultaneously; and on the 11th ult. the two gangs of workmen met. Of course, a good deal of trimming up remains to be done; but the tunnel is an accomplished fact. It is 2516 ft. 6 in. long, 8 ft. 6 in. high, and 10 feet wide as a rule; and it has been carried out under the superintendence of Mr. C. M. Jacobs, who has had experience of similar work in England and Australia. The formal opening took place on the 14th ult.

The Plymouth Gas Bill as Settled.—It may be remembered that at the close of the proceedings on the Plymouth Gas Bill before the Earl of Morley's Committee, as reported in the JOURNAL for the 17th ult., the Parliamentary Agent for the promoters (Mr. Cripps) asked his Lordship to pass the preamble, but to keep back the report, to enable him to confer with Mr. George Livesey on certain matters on which some difficulty had arisen. We understand that the financial portions of the Bill have now been settled. The conversion of the 10 per cent. capital, paying 12½ per cent. under the sliding-scale, into double the amount of 5 per cent. stock, paying 6¼ per cent., was a simple operation, and it was allowed. The 10 per cent. stock receives an increment of 5s. per cent. for each penny reduction; and the 5 per cent., 2s. 6d. per cent. for each penny—an exact equivalent. It is different with the 7½ and 7 per cent. stocks, because they also receive, under the sliding-scale, 5s. per cent. for each penny reduction, instead of the proportion of 3s. 9d. and 3s. 6d. per cent. respectively. Consequently, to convert these stocks, now paying 9¾ and 9¼ per cent. respectively, into equivalent amounts of 5 per cent. stock paying 6¼ per cent. requires an increase of the capital, which Lord Morley and Sir J. Warner would not allow, on the ground that it would form a dangerous precedent. A sum of £70,000 of 7½ per cent. stock converted into 5 per cent. stock would be £105,000; but £70,000 of 7½ per cent. stock paying 9¾ per cent. converted into an equivalent amount of 5 per cent. stock paying 6¼ per cent., would, in order that the holders should get the same income, have to be converted into £111,428; and this increase was not sanctioned. These stocks, therefore, remain unchanged. A sum of £30,000 of 7 per cent. stock would become £42,000 of 5 per cent.; but £30,000 of 7 per cent., paying 9¼ per cent., would become £45,306 of 5 per cent. paying 6¼ per cent.—an increase of £3306.

TECHNICAL RECORD.

THE GAS INDUSTRY IN THE UNITED STATES.

By Herr W. von Oechelhaeuser, of Dessau,
General Director of the German Continental Gas Association.

A Lecture delivered at the Meeting of the German Association of Gas and Water Engineers at Carlsruhe, June, 1894.

[It should be explained that Herr Oechelhaeuser and Dr. H. Bunte proceeded last year to the United States on a tour of investigation into the condition of the gas industry. The present lecture is, so to speak, Herr Oechelhaeuser's report on the results of his labours, which, as he points out quite early, were mainly confined to the investigation of the business of the distribution of gas—his colleague undertaking to deal with its production. The notes throughout are the author's.—ED. J.G.L.]

INTRODUCTION.

Gentlemen,—The abundance of material which almost overwhelms every visitor to America is brought under the reporter's notice with particular force when he is called upon to compress within the narrow compass of a newspaper article even a small part of the most remarkable things he has seen, and, if he be qualified to judge them rightly, appreciated. It will therefore be understood that, notwithstanding the arrangement come to between Professor Bunte and myself, for the division of our joint labours, many very essential features and many an interesting technical detail have had to be omitted from this report; and I can only hope to have an opportunity of making up for these omissions in the form of a supplement, by the time the report is published. Meanwhile, I do not wish to trespass unduly upon the valuable time of meetings such as this; and I trust that you will not misconstrue my intention, but will believe me to be moved solely by a desire to be brief, when, in the course of the present statement, I occasionally refer to the lecture I delivered in November, 1892, in Berlin, before the Prussian Industrial Association (Verein zur Deförderung des Gewerbfleisses in Preussen),* since many of my American notes are so closely connected with the remarks I then made as to practically constitute a supplement to them, and to relieve me from the task of once more going over the same ground, and resuming the same lines of argument.

Although it is an unquestionable fact that, in the course of such a journey as I have made, a specialist must necessarily perceive and grasp things more quickly and more clearly than a layman, and although he may be better able than an ordinary observer to account for many things which, at first sight, appear strange or phenomenal (being in a position more readily to discern the connecting-thread between cause and effect), even an expert, in attempting to give an account of his impressions, though the particular industry to which they relate may be never so familiar to him, can only present, at best, sketchy and what may be called "instantaneous" delineations of what he has witnessed—delineations, indeed, which he must not be surprised to find require to be corrected and touched up in many particulars, should they come under the notice of his American *confrères*, who are necessarily more fully acquainted with the subject than he can be. Having, then, made these reservations, I hope I shall be understood to give the following "instantaneous pictures" merely as utterances of my own views, seeing that, to continue to speak in the language of photographers, in order to make careful "time exposures," I needed the most essential requisite—"time."

My arrangement with Herr Bunte was that he should show how the gas was dealt with from the moment of its generation to the time it reached the gasholder; while I was to follow it on its way thence to the consumers' houses. Now the distribution of gas is not less important than its production, for the reason that the technical and economical advantages which the conveyance of the gas from the works to the consumers' dwellings may present may be regarded as, to a great extent, characterizing the method by which a central plant works. Indeed, it is to the ignorance or disregard of the difficulties appertaining to the distributing plant and the expenses it involves, that the ruin of many contemporary industries, which otherwise bore a very promising aspect, has been due. When the cost of production of light, heat, and power has been covered, all is not accomplished, for the cost of the delivery of these commodities to the customers very frequently is just as high as, or higher than, the cost of manufacture in America. The fact is observable in many places; and it is for this reason that both Americans and Englishmen make a sharp distinction between the cost of gas "into the holder" (*i.e.*, until it is stored up) and its cost as supplied "to the meter"—in other words, as supplied to the consumers.

I.—AMERICAN GAS-WORKS AS CENTRAL HEAT-PRODUCING STATIONS.

One of the questions which I bore constantly in mind during my visit to the American gas-works was that which I had before mentioned in the course of my lecture at Berlin—viz., whether gas-works are suitable for central heat supply, and to what extent it is desirable that they should strive to become such

* See JOURNAL, Vol. LXI., pp. 590, 635.

sources of heat. Now, in this respect nothing is more instructive to the observer than a survey of the distributing and consumption of natural gas in America; for, although we do not ourselves possess this natural treasure in Germany, yet it is undeniable that this particular gas is the cheapest that can be made available for the service of man, since it need not first be manufactured, but is simply obtained by boring the soil, and it may then be conveyed directly to the place or places where it is to be utilized. By observing, therefore, the manner in which the gas is distributed and consumed, it may best be ascertained to what extent the supply of heat for practical purposes from a central station, and with gas as a heat-producer, is compatible with the realization of such reasonable profits as an establishment of this kind can justly lay claim to.

The first "instantaneous picture" which I shall have to present to you will give you some idea of one of the latest and best fitted works for the supply of natural gas, which furnishes Chicago with combustible gas from the remote natural gas-fields of the State of Indiana. The owners of the gas-fields situated in the environs of the village of Greentown, Indiana, are the Indiana Natural Gas and Oil Company; and the Company co-operating with the owners, and entrusted with the management of the distributing of gas, is the Economic Fuel Gas Company of Chicago. To reach Greentown, one has to ride by train or coach for several hours. It is there that, next to a settlement, composed of small villas—mostly, according to local custom, one-storeyed houses built of wood—the very interesting gas-compressing works of the Indiana Natural Gas and Oil Company are situated. The experience gained hitherto on other gas-fields, in regard to the fluctuating and gradually decreasing pressure of the gas-wells, has been there taken advantage of in the erection of a compressing plant on a large scale in the offshoots of the gas-fields to Chicago, whereby the possibility is afforded of increasing the natural gas pressure (which in the wells amounts to about 21·1 atmospheres, or 300 lbs.) twofold, so as to enable the long double pipe-line to Chicago to be reduced in diameter to the minimum of 8 inches. At the time to which I am referring, fifty gas-wells, about 1000 feet deep, were being worked. One so-called "small" well supplied about 2,000,000 cubic feet of gas per 24 hours, which was about equivalent to the daily yield of the Chemnitz Gas-Works; while the yield of the largest well amounted to four or five times more—say, about 9,700,000 cubic feet—which exceeds the daily production of the large gas-works of the City of Hamburg. One of these wells was blown off in my presence. For this purpose the iron plug by which the 3-inch well-pipe had been closed at the top was removed, and one of the planks of the small wooden structure (not unlike a booth) surrounding the borehole, broken away. Before doing this, however, I had been charitably advised to carefully stop my ears—a well-timed recommendation, since the detonation produced by the gas being blown off at a pressure of about 20 atmospheres is like that of a tremendous explosion. I was reminded of this blowing-off affair a short time ago, when I read in one of the American gas journals that, in starting one of the most extensive wells of the Indiana gas-fields, the boring-machine was, with a deafening crash, blown away—the noise causing great excitement among the inhabitants of the neighbouring districts for several miles around.

In regard to the compressing works of Greentown, I have added a few particulars in the supplement annexed to this report. For the present, it will be sufficient to state that it includes a boiler-house which, at the time, contained 14 steam-boilers of 90-horse power each.* The boilers are heated with natural gas, and the compressors are arranged in a building entirely separate from the boiler-house; seven compressors of 200-horse power each having first been erected. Notwithstanding the technical accomplishment of the whole plant, one feature of it may cause some surprise—namely, that the natural gas is, to begin with, burnt under 14 steam-boilers, by the aid of a large chimney; thereby first causing very great loss of heat in the furnaces, and, after that, resorting to water as a vehicle of power, instead of converting the natural gas into heat and power directly in a gas-engine. This complication of the heating process struck me, not only on account of the considerable loss of fuel which it entailed, but also by reason of the very great increase of the capital which had had to be invested in the installation; for it is a well-known fact, with regard to America, that the utmost economy in the initial capital outlay is regarded to be the primary condition of success. Besides, in employing gas-engines ignited by electricity, the danger from fire would have been materially less than it is now, owing to the employment of steam-boilers. Indeed, the fact that such a danger does exist in the present case, where the working pressure of the gas is up to 40 atmospheres, and that it is particularly great in the compressors and pipes, had evidently been recognized; and it was, no doubt, for this reason that the boiler-house was erected at a considerable distance from the engine-house, while, in the latter, various interesting measures of precaution were taken against danger from fire. The managers of this undertaking are, however, in no way to be blamed for this omission. which is amply accounted for by the circumstance that America, for reasons which I shall consider later on, is still far behind Europe as regards the frequency of employment of gas-engines, and the variety and size of their construction. It was, therefore, scarcely likely that the idea would occur to the devisers of the plant in question, or that they would undertake the first risk in America of such a plant, simply to employ gas-engines of from 90 to 120 horse power, operated by natural gas, instead of boilers of 90-horse power and a steam-engine of 200-horse power in each case.

An object not less interesting than the compressing plant was the double high-pressure conduit leading to Chicago, 115 miles long. This pipe-line combines the results of all experiments hitherto made as regards the choice of material to be used in the construction of such pipes, and the methods of tightening the joints; for some of the older pipe-lines from other gas-fields—carelessly made from the beginning, and then still more perfunctorily attended to—are said to cause losses varying between 30 and 40 per cent. The double conduit in question consists of wrought-iron pipes of the best quality, 8 inches in diameter, provided with conical screw-threads, and tested to a pressure of 84·5 atmospheres, or 1200 lbs. per square inch. These lengths of pipes are joined together without the interposition of any packing; being simply screwed into each other, after their respective screw-threads have been oiled. The tightness of the joints of these pipes, when tested, proved to be nearly perfect. At a pressure of about 42 atmospheres, or (say) 600 lbs., the loss of pressure observed after three or four days did not exceed 0·35 atmosphere, or 5 lbs.; while the loss of gas throughout the conduit only amounted to about 0·83 per cent. In actual practice, the aggregate loss is estimated at the maximum of 1 per cent. It is stated that the maximum quantity of gas may be forced through the two conduits when the terminal pressure is equal to just one-half of the greatest initial pressure—*i.e.*, when it amounts to 30 atmospheres. From this it would appear that each pipe is capable of transmitting about 706,000 cubic feet of gas per hour, or (as this gas has 1000 B.T.U. per cubic foot, or 8500 calories per cubic metre,* 20 cubic feet giving 1-horse power in the engine) each pipe or conduit may transmit 35,000-horse power, or the double conduit about 70,000-horse power. This is an interesting example of the enormous capability of transmission of power † with gas-pipes which I more specially emphasized in my Berlin lecture, and which is all the more remarkable as the loss it involves, apart from compression, is in those cases reduced practically to *nil*. Mr. Forbes, the well-known English electrician, who, at the time, was employed in finishing the grand electrical device of the works at the Niagara Falls, and whom I met on the spot in July last, informed me that it was intended to convey 10,000-horse power of the hydraulic power available from there to Buffalo—*i.e.*, a distance of 15 miles; and that, later on, this amount was to be increased to 25,000-horse power. Therefore the existing conduits for the transmission of natural gas from Indiana to Chicago convey up to this time a quantity of power seven times larger, and for a distance seven times longer, than the quantity and distance contemplated in the first Niagara project referred to. That distance is about 6 miles longer than the famous distance between Lauffen and Frankfort-on-the-Main. The cost of the pipe-lines amounted to about $1,500,000, which brings the cost of 1-horse power, delivered at a distance of about 116 miles, and fully utilized, down to only 90 marks.‡

On its arrival at Chicago, the gas is distributed under the control of the Economic Gas Fuel Company by means of a special low-pressure system of mains, the whole length of which amounts to about 160 miles. The price of this natural gas at Chicago is 50 c. per 1000 cubic feet; being just half the price at which gas is supplied for producing heat and motive power by the coal water gas-works of Chicago. Notwithstanding—and this was a point I was very anxious to ascertain—not one of the persons participating in the management of this undertaking cherishes the delusive hope of being able, at this rate, to displace or supersede all existing heating apparatus, to monopolize the heat supply throughout Chicago, and especially to supply the whole of the Chicago industry with gas from a central station. Neither was this hope indulged in by the management of the Detroit (Mich.) Gas Company; that Company having natural gas supplied to it from the State of Ohio, a distance of 92 miles, and selling it 33 c. per 1000 cubic feet.

(*To be continued.*)

* In referring to the size of boilers, Americans always state simply the number of horse power they represent; so that the one figure summarizes, as it were, in a synoptic form, the heating surface, evaporation, and steam pressure. By knowing, therefore, the number of horse power of a given steam-boiler, its power or working capacity may at once, and without any difficulty, be compared to that of the steam-engine it supplies.

* The artificial water gas obtained from coal generally gives only some 700 B.T.U=5850 units of heat; non-luminous water gas, about 2600 units of heat.

† Although, strictly speaking, this is not a case of direct transmission of power, but merely one of conveyance of fuel, yet, for practical purposes, it may not be wrong to consider it in comparison with the existing means of transmission of such driving mediums as electricity, compressed air, steam, and water, inasmuch as these means of transmission also carry the power-producing agent from place to place, not in the form in which it can be directly utilized as power, or applied to the driving-shaft, but in a condition which requires the use of a special motor or engine, which, indeed, is more simple than a gas-engine, but which, like the latter, entails considerable losses in the process of converting into motive power the agent supplied.

‡ Where the distances are shorter, the cost of producing 1-horse power will also necessarily be less. Thus the cost of sending 25,000-horse power through the double conduit from Schmargendorf to Berlin, a distance of 4·7 kilometres (about 3 miles) does not exceed 30 marks per horse power.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

The Annual Meeting in Glasgow.

We resume to-day our report, commenced last week, of the proceedings at the above meeting.

Discussion on Mr. J. Ballantyne's Paper on "Cooking by Gas."

Mr. J. Ballantyne (Rothesay), at the call of the President, gave a summary of his paper, on "Cooking by Gas," read at the Dundee (1893) meeting.* He said he thought it would be advisable for the members to have a very short summary of the various points touched on in his paper, so as the better to bring it to their recollection. After giving a brief account of the introduction of cooking by gas into Scotland, the paper proceeded to relate that the hiring-out of gas-cookers was begun in Rothesay in 1886; and at the end of six years the annual output of gas had increased 48 per cent., while for a certain time during the summer months it was 100 per cent. The output last year was over 50 per cent. of an increase; and the number of consumers supplied with cookers was 13 per cent., as compared with 11 per cent. stated in the paper. But he should not feel satisfied until they had two or three times this number. It was only a question of time. Gas-cookers as an investment for a corporation or company were then referred to; as also repairs, and fixing the stoves up free of charge. The number of cookers returned to them in the course of the year was brought under notice; and to reduce this as much as possible, a graduated scale of charges was recommended—according to the time a cooker had been in use. In Rothesay, they had now carried this arrangement into effect; and in future, those who had cookers from them would be asked to pay only 5 per cent. at the end of five years, instead of 10 per cent., which was formerly the charge. He was quite convinced that this was a step in the right direction, and one which would encourage consumers to keep their cookers. As a proof of this, one or two parties had already told him they had meant to have a change at the end of this season; but now they would stick to the cooker they already had fixed, seeing they would get it cheaper. He had not heard of any other town adopting this system; but perhaps the discussion might bring out some more information on the point. Differential rates for gas consumed were also touched on in his paper, and also the advantage of encouraging the consumption of gas for cooking and for purposes other than lighting—in the event of electricity, or some other competitive light, becoming the light of the future. The corporation or company which pushed this part of its gas undertaking need have no fear of any rival; as what would be lost in one direction would certainly be more than gained in another. He would therefore advise the "locking of the stable door before the steed is stolen."

The President next called upon Mr. Douglas Hall, the Past-President, who, he had no doubt, was in a position to discuss the question, seeing that Mr. Ballantyne's paper was read during his year of office.

Mr. Douglas Hall said he had prepared a short statement, which (with the permission of the meeting) he would read. In his paper, Mr. Ballantyne said that every manager had a field to work in, and a paying one in every case that had been tried. There was, as Mr. Ballantyne said, no extra plant to provide, as the principal gas consumption in stoves came at a time when they were almost idle. This helped them to equalize the load, as an electrician would say. When corporations or companies fitted up and let out for hire gas cookers and stoves, they were responsible for the success of the stove; and this, as they all knew, depended on a good supply of gas. Other parties who sold stoves only cared to get a stove off their hands; and whether it was a success or not did not bother them. The gas-mains or the quality of the gas were indifferently blamed. No doubt it was a safe investment. The return for gas alone would ensure this; and seeing that in all works a certain number of men must be kept on, the extra gas produced meant, to many of them, only the cost of the coal carbonized. Repairs to stoves were trifling; for the quality of the goods in the market ensured that this item must be small. They needed repairs, he thought, as rarely as ordinary coal grates. As a rule, to keep the stoves clean was the only thing that was required by a gas-cooker in a lifetime. Differential rates, he thought, should be encouraged; and he could not see how this allowance could be held to be unfair to anyone. He certainly did not see why they should not stretch a point, and supply gas a little cheaper to those who used it for other purposes than lighting, without injuring anyone. They all had the same chance if they used gas for other purposes than lighting. Of course, a separate meter was necessary. But where meter-rents were charged, this would really become a source of income; and if meter-rents were not charged, then it must be included in the charge for gas. The gas consumed by day should, in his opinion, if it were possible to measure it, be charged at a lower rate, in view of the fact that it was supplied at a time when their mains were almost idle. Discounts were all very good in their way; but his experience of them was that no amount of discounts would satisfy a consumer who was using gas for other purposes than lighting. If the electric light, as Mr. Ballantyne had said, was in course of time (whatever that might mean) to become the light of the future, then encouraging the use of gas for cooking, heating, and motive power by every means was the weapon with which they must fight electricity; and a very formidable weapon it would prove to be. Coupled with incandescent gas lighting, their future hope lay in these two powerful outlets for gas, if they went on developing as they had done in the past ten years; and as they did so, they could reduce the illuminating power and the price of their gas without reducing its utility. The electric light had had, and would still have, a stiff pull; and when it had reached the summit of perfection, gas need not be far behind—on a peak equally high, if not higher. Only let gas managers do their duty, by developing fully the resources of coal gas, and they might, to the end of time, not only hold their own, but go on increasing as they ever had done.

Mr. D. Robertson (Dunoon) said he had much pleasure in relating his experience in the hiring-out of gas-stoves, and also with regard to differential rates for gas used for cooking and heating. About three years ago, they were induced to hold an exhibition of gas cooking and heating appliances; and they had no reason to regret having done so. They had a good demand for some kinds of cookers from the very beginning, and this demand was still being kept up; in fact, since the month of March last, they had—in a small place like Dunoon—sent out 60 gas-cookers, and there was no sign of the demand being diminished. There was no doubt that the hiring-out of gas-stoves entailed a great deal of extra work upon the manager; but a manager who was eager, counted his services only as a secondary matter. At the same time, there was a good deal of trouble in seeing them fitted in; inspecting them after they were fitted in; and attending to them. People would make complaints about small matters, which must be attended to until they were satisfied. After they got a cooker, it took them about a month to get satisfied with it; but after that there was very little trouble. At Dunoon, they also resolved, when hiring-out cookers, to reduce the price of gas from 5s. to 3s. 9d. per 1000 cubic feet for cooking and heating; and he was of opinion that, if they had not done so, their hiring-out of cookers would have been a dead failure. He did not think anybody in Dunoon, or at least very few people, would have used gas for cooking or heating at 5s. per 1000 cubic feet. And it was not entailing any injustice upon consumers of gas for lighting to give a reduction to their consumers for cooking and heating. It paid them perfectly well to sell gas at 3s. 9d. for cooking and heating; and why should people who were inclined to use the gas in this way not get the benefit of it? Unfortunately, he did not hear Mr. Ballantyne's paper last year; but he read it carefully, and from what he read of it, and from the consideration he gave to it, he thought it was a really remarkable paper for going into details. He thought Mr. Ballantyne told them everything it was necessary for them to know in the matter of hiring-out cookers, and of matters connected with it. The hiring-out of cookers had been most successful in his own case; and he had no doubt that any manager who might try it would not regret it. It had led to an increase of about 16 per cent. in their gas consumption already; and he had no doubt that, if the present signs continued, it would go on increasing. He might also add that they were hiring out prepayment meters with their gas-stoves. They found that a great many of the better-class houses would not take in a gas-stove because they had a suspicion that the servant might waste the gas. He had no doubt they had very good grounds for the suspicion; and, to overcome the difficulty, he prevailed upon his Directors to agree to use prepayment meters if desired. They formed a very good preventive; because if the servant used more gas than the mistress thought she ought to use, she was obliged to pay for the extra gas herself.

Mr. D. Vass (Portobello) said he had had some small experience with gas-stoves, and he must congratulate Mr. Ballantyne on one arrangement—the reduced rate for hiring as the season went on. The great advances made from time to time in the construction of gas-stoves induced people to ask for a new stove; and it really did not pay the company to give a new one in place of the one they had already let on hire. Mr. Ballantyne's arrangement induced the customers to hold on to the stoves they already had. There was another matter which he (Mr. Vass) thought should be pressed; and that was the keeping of the fitting of the stoves in the hands of the gas company themselves. It was a great mistake to hire-out stoves, and leave it to the gas-fitter to fit them in. At Portobello, they did the fitting themselves free; but in some other towns, this was not done. Whether, however, it was free or not, he thought that the corporation or the company should do the fitting in, and not leave it to the gas-fitter, for this reason, that the gas-fitter could not instruct people in the way of using the gas. They had found it necessary to instruct people when stoves were put in. His men had instructions to tell the consumers how to use the taps, and how to avoid accidents in lighting. They had had two or three accidents by people turning on the gas before they opened the stove door; and in one case of this sort, they had to allow the doctor's expenses. They now had a rule that their gas-fitter must instruct the people how to use the gas before he left.

Mr. Ballantyne, in reply, said he was pleased, in one sense, with the discussion, and in another sense he was not, because

* See Journal, Vol. LXII., p. 312.

there had really been no discussion in the way of wanting more information, or discussing the points brought up in his paper. Mr. Vass was in favour of differential rates. The only objection he himself could see to the differential rate was the extra meter which must be put in, and which meant extra cost. But, as he pointed out, where they charged for meters they had a revenue, and there was no great hardship—the corporation or company always had a return for the money invested. Of course, where there was no charge, there would be no return; but it was a mere matter of opinion. They used to allow the gas-fitters in the town to get a share from time to time of the fitting-up of cookers. They departed from this arrangement, however, because they found the gas-fitters' charges were rather high; and they thought they could do the work better themselves. Of course, they reduced the charges very much—they took away the gas-fitter's profits, and fitted up cookers at cost price. Their men also had orders to instruct the people how to use the cookers; and he thought this was another reason for keeping the fitting up of the stoves in their own hands. The better they were fitted, the better returns they had.

The PRESIDENT, in closing the discussion, said that Mr. Ballantyne complained of the rate at which gas cooking was progressing. It had been said that if men were to be put into the position of being house-servants, and had to take their turn at cooking, there would not be a house in the kingdom without a gas-stove. He had no doubt that people only required to know the advantages of gas-stoves to at once adopt them. With regard to differential rates, Mr. Robertson had told them what they could do in Dunoon. But might not he (Mr. M'Gilchrist) retort that, if he gave the consumers of gas for lighting an equal opportunity, he might do away with a good many of the paraffin lamps which, he knew, were in Dunoon, and thereby still further increase the consumption of gas? Again, he considered that a second meter being fitted into any house was (from other than the meter manufacturer's point of view) waste. When one meter might do the work, there was no occasion for two; and therefore either the company or the consumer lost, in the long run, by it. Their good friends the meter manufacturers had, perhaps, the best of it. He asked the meeting to accord to Mr. Ballantyne a very hearty vote of thanks for the paper he had read, and for kindly coming there that day and replying to the criticisms upon his paper.

DISCUSSION ON MR. A. YUILL'S PAPER ON "THE PRACTICAL RESULTS OF ENRICHING COAL GAS FROM OILS BY THE PEEBLES PROCESS AT ALLOA GAS-WORKS" (*ante*, p. 234).

The PRESIDENT said they had heard a very excellent paper from Mr. Yuill, giving the result of his experience. He was very much pleased to see one of the oldest members of the Association there that day—he referred to Mr. Whimster, of Perth; and he was exceedingly glad to know that he had taken up this new invention. He would ask Mr. Whimster to be the first to speak in the discussion, as a compliment to him.

Mr. THOS. WHIMSTER (Perth), having expressed his thanks for the compliment, said the process of manufacturing oil gas which was known as the Peebles process, he thought, from what had been published and what had been said about it—and especially, he might say, from the carefully prepared paper they had just heard—could not be challenged as to its financial claims on the attention of gas managers. He was not prepared with any figures, or anything of that kind; in fact, only the previous evening he did not think he would be able to attend the meeting. But the way was opened up for him; and he thought he would like to hear what was going to be said about the process, and especially what he was expecting later on from Mr. Young. He (Mr. Whimster) came to be a hearer; not to be a teacher or speaker—he was a gentleman-in-waiting, looking out for information. As they knew, he had had nine oil-gas retorts going at Perth during the past winter—since November; and the figures that Mr. Yuill had just given them approximated very closely to his own results, both as to the quantity and quality of the gas produced. The oil was not the green oil; it was of ·850 specific gravity, he thought. It was pale-coloured, like sherry; and they did not, perhaps, yet get quite so much coke from it as from the green oil, although they had very nearly 5 cwt. per ton of oil. When they started the process, he went to considerable trouble to inform himself about matters all round, and more especially as to what Mr. Yuill had referred to in the closing of his paper, about the probable rise in the price of oil; and he did not think there was any cause for fear in that direction. He did not think so then; and he did not think so now. The process of paraffin production in Scotland was almost stagnant, in consequence of the want of a market for the crude oils which were left after the paraffin was extracted. There was plenty of shale in the country that could be utilized, and would be utilized, he thought, now that the value of the oil had risen to something which was very likely, if he was informed rightly, to make the process of paraffin manufacture profitable, yielding good results to the shale distillers. He hoped that this would be so. As had been said, they had the Russian market to fall back upon; but he looked mainly at their home stores, arising from the shale. He need not go into any matter about results, because Mr. Yuill had placed them very fairly before them. He might, however, say that, when they began at Perth, they met with some unanticipated troubles. That was always the case when they made a new departure. All his life, if he made a new departure, he was sure to get into trouble; but then that only set one's wits in motion, and they always found their way out, and in the end they always had more knowledge than when they began. In this matter, they had the cracking of the retorts, which he attributed to the liquid oil reaching a portion of the retort which was at a certain temperature; and the contraction caused by the rapid cooling at that particular point, cracked it. They had not much difficulty with that. They could heal the crack; and as it grew they could heal it, and heal it again. His greatest difficulty was in applying heat sufficient to an iron retort to give a temperature high enough to gasify the condensable products of the oil. These required a higher heat than was needed for the fresh oil; and they found difficulty in doing this. In trying to raise the temperature, they melted their retorts. However, they overcame this difficulty; and they managed to heal up a pretty large hole, by applying tiles and cement. This year he had turned the retorts upside down, and based them with heavy iron. They had been working one bench of them, after that, for about six weeks, and had found them doing very well, with no appearance of failure in any way. He hoped Mr. Young had, in his later invention, fallen upon something that would help them. Their great object was to get something that would enable them to raise the temperature of the retorts to, at least, he would say, 1400° Fahr. He thought the temperature for the distillation of the fresh oil was something between 1000° and 1200° Fahr. Mr. Young would put them right about that; but he (Mr. Whimster) considered they wanted to get it raised to about 1400° Fahr. They at Perth this year put in other thirteen retorts, in one bench, for oil, and eight retorts for tar. He could not give the results; but they were certainly making gas, and they were making coke, and if there was much oil condensed, it would come back and they would just treat it over again. So they were in this position, that they were thankful they had adopted the process. They saw no reason to draw back, or to say that they acted rashly; and they were hopeful. "Hope springs eternal in the human breast;" and they were in a very favourable position, with no fears for the future. He had nothing more to add except that, if he was spared to be at another meeting of the Association, which perhaps he might be, he would probably be furnished with something better.

Mr. A. MACPHERSON (Kirkcaldy) was sure they were all very much indebted to Mr. Yuill for his most valuable paper, and for the remarks which they had had from Mr. Whimster with regard to the Peebles oil-gas process. He (Mr. MacPherson) must say that this was a process which was most unique; and he might add that he believed it was a process which was destined to be a most valuable one. Any remarks, therefore, he had to make, he hoped would not be construed as against the process. All he wished to say was that, in the table prepared by Mr. Yuill, he gave the cost of manufacture during the period from the 1st of October, 1893, to the 31st of March, 1894; and then he went on to give the cost of the raw material only. Now, there was much more to be considered than the cost of the raw material. They had to look to the cost of the manufactured article; and he found that Mr. Yuill mentioned splint coal yielding 9300 cubic feet of gas as the basis of his coal gas supply, when enriching with oil. If they looked at it in this way—take his own position, for instance: He used 40 tons of coal, on an average, each day in the dead of winter, producing 11,000 cubic feet of gas per ton. This was equal to 440,000 cubic feet; and he found that, in order to produce this quantity of gas in the way that Mr. Yuill did, by using the oil and the coal, he would require to have as many retorts going, as many stokers employed to produce the rough gas, as he had to produce the higher quality gas direct from the coal. So that, instead of there being any saving in labour—which Mr. Yuill certainly said he had not had—in his own case, he did not see that there would be any saving. He would say that if he had produced 440,000 cubic feet of gas of high quality direct from the coal, and he required the same amount of labour, the same number of retorts, the same fuel, and everything, to produce 366,000 cubic feet of rough gas, then the whole of the expenses of the oil process ought to be added. He could see, therefore, that in his own case there could not be any saving—at least, in labour. There was another matter that Mr. Yuill referred to—viz., the continued supply of oil. It was to be hoped that, if the Peebles process became universal (which he had little doubt it would in a very short time), they would be able to keep up the shale oil supply; but in case they could not, Mr. Yuill said Russian oil could be substituted. Now he found lately that the cheapest rate at which they could deliver Russian oil in London, even with tank-ships and pipe-lines, was 3¼d. per gallon, or nearly double the original cost for oil as given in the paper. This was all in the paper he would like to bring before them. Otherwise, he thought the paper was one which had been very carefully prepared, and one which, he was sure, they were all pleased to see; for the process could develop remarkable results, and ultimately it was sure to be very beneficial to gas companies and corporations generally.

Mr. A. BELL, sen. (Dalkeith), said that at their last meeting he mentioned that he was going to adopt the oil process, and might this year be able to say something about it. Like Mr. Whimster, he had no figures; because he thought it almost superfluous to have any. It would be simply saying "ditto" to

what Mr. Yuill had said. But he would like to make a remark about what Mr. MacPherson had stated. In his (Mr. Bell's) case, it cost him nothing more to make oil gas; the oil retort made as much gas as the ordinary coal retort.

Mr. MacPherson said that Mr. Bell did not seem to have grasped what he had said, which was that, taking his maximum manufacture of gas in winter as 440,000 feet, he could produce this quantity from coal with a certain number of retorts; and he found that it required the same number of retorts, and the same amount of everything, to produce the 366,000 cubic feet that was necessary with the oil process.

Mr. Yuill said that, so far as he could make out Mr. MacPherson, his contention was that he took the coal he had been using. But he would require to take another coal; and perhaps it might, instead of giving 9300 cubic feet of gas per ton, give 11,000 cubic feet. He could say that he had a coal placed before him the other day, and instead of yielding 9300 feet of 16·05-candle gas, it gave 11,000 feet of 18-candle. It thus came to be a question with him which of these coals was to be the cheaper.

Mr. Bell said that was the very point; and Mr. Yuill had brought it out clearly, that it was all a question of the coal. If they were to use a coal that gave a high yield of gas, they would require fewer retorts. But they might get a cheap and poor coal; and they could afford to take it for enrichment, which they could not afford to do without enrichment. He had also suffered from the cracking of his retorts—mostly from irregularity in heating. Mr. Yuill mentioned that his iron retorts used to crack when employed with coal. So they did; but from a very different cause. His observation was that there was a very close contact between the oil and the retort; and that it was through being suddenly chilled in the interior that the cracking was caused. The oil formed a hard carbon; and, in drying up, the whole body of the retort became heated again, and the interstices were filled up with the carbon, hard as steel. When the heat came on again, it tended to rupture. He thought the putting in of a steel plate would be a remedy. In his own case, he had the unfortunate experience of having to change his men in the very depth of winter; and to get strange men to come into their works at the time of maximum make was not a good thing. They overheated the retorts two or three times, and so injured them. The cracking was, however, a mere mechanical difficulty, which was sure to be overcome. As to extra labour, he knew that when he stopped the oil process for some time, the men grumbled at the extra labour, and begged him to put it on again. He felt that the process was easily wrought, and easily managed; and that with it he had the power of raising the quality of his gas in an emergency, which enabled him to save a great amount of labour. His men did not think so at one time; but they were aware of it now.

Mr. S. Stewart (Greenock) had had great pleasure in listening to Mr. Yuill's paper, which was the more interesting to him, as they were about to put in an installation of the oil process. He was exceedingly gratified to find the results given in the paper. He had no doubt that the process would become more general; because if they obtained the same illuminant from one ton of oil as from six or seven tons of shale, and the labour must be greater in handling the latter, the oil was bound to come to the front much more than it was doing. It was also very gratifying to know of the permanency of the gas, because there was at one time a doubt about that. They knew that, in producing gas from coal, there was always a certain deposit. Mr. Young had shown them that, by putting the oil into the retort over and over again, they obtained a large amount of permanent gas; and he had reason to suppose that the oil gas would remain more permanent than in the ordinary process of gas making. In taking a low quality gas and mixing it with the oil gas, there was a better chance of the gas being carried forward. Of course, he had had no experience yet; but he was only too gratified to get Mr. Yuill's (and Mr. Whimster's) experience, and they had both been very kind in giving the meeting all information before they started. Next year he hoped to give them his experience.

Mr. Thos. Wilson (Coatbridge) said he would just like to ask Mr. Yuill one question as to the table before them. Were the figures in it after taking credit for residuals?

Mr. Yuill: No; those are the gross costs.

Mr. Wilson: Would it not have altered the figures considerably if you had taken credit for the residuals, especially in the last?

Mr. Yuill: I have taken credit in some of the tables; in those for the full six months' working I have given the cost of the material, and the yield, less residuals.

Mr. Wilson said the figures would have been altered considerably if Mr. Yuill had worked with only splint which cost 8s. per ton. The residuals from a ton of splint coal must be considerably greater than in Mr. Yuill's mixture. Were they, he asked, to understand that the people of Alloa were being supplied with 31-candle gas? If so, what burner did they use? They had great difficulty, at Coatbridge, in getting a burner to usefully consume 25-candle gas. He thought that if these questions were answered, a little light might be thrown upon the subject.

Mr. J. Hepworth (Carlisle) did not feel himself in a position to discuss the paper, because it was a subject with which he had no acquaintance; but he would like to ask one question. Could Mr. Yuill give the meeting any information as to the relative charges for wear and tear with the oil process as compared with the ordinary process with coal?

Mr. A. Terrace (Bonnyrigg and Lasswade) said that, as the Manager of a small gas-works who had had the Peebles process in operation for about a year, he might be allowed to make one or two remarks on the subject. He must say they had had very satisfactory results; in fact, so far as the financial prospects of the process were concerned, he thought he brought with him one of the best evidences in its favour. In the first place, last year they were obliged to renew their retort-bench; and being a little late in starting operations, they were somewhat handicapped during a good part of the year. Secondly, his carbonizing results were not nearly so good last year as might have been expected. Also, through the action of the steam road-roller, his leakage account was raised from 12½ to 18½ per cent. Then, further, on account of the rebuilding of his retort-bench, they had increased their capital from £2500 to £3000; and consequently they had to secure a dividend on the higher capital. That was another thing they had to contend with; and, besides, they had some incidental expenses. With all these drawbacks, it was very gratifying to know that their year's working had turned out most satisfactorily; in fact, more satisfactorily than he ever had experience of with coal. As far as the practical working of the apparatus was concerned, he might say, like Mr. Whimster, that he had some little difficulty at first. His chief trouble was with stopped pipes, the reason for which was, he conjectured, that he was using too high heats, and putting in too small a run of oil. Of course, when he was told that such a thing could be remedied, he altered his system of working; and since then he had had no difficulty in making everything work smoothly. So far as cracked retorts were concerned, he might say that he had been very free from that trouble. Whatever had been the cause of this, he could give no explanation. He might, however, say that, during the whole time, he had given it his own personal supervision from day to day—studying the thing from every point; and he thought it was through this that he had been successful in preventing the cracking of his retorts. His mode of working was, when starting the process, after removing the coke from the preceding charge, to run in the condensed products a little fast for a minute or two; and the retort being pretty well heated up, it gasified the oil from the condensed products right off, as they came in. After that, he toned down the supply a little—letting it run a little slower; and he might say that after three, or four, or five hours, he was able to use anything. He thought this was the best method to adopt, because there was not the same chance of injury to the retort by it. Again, if the retort should happen to be a little cracked, the condensed products were suitable for filling up the fissures better than the virgin oil would do. He was certainly obliged to Mr. Yuill for his elaborate paper; but it was scarcely a paper they could come there to criticise. In his (Mr. Terrace's) installation, he had a boiler for the storeage of oil, which took up little space; and in these days, when strikes were common, it was something to have storeage which went into little space.

Mr. D. M. Nelson (Glasgow) said that there was one feature which he was very glad had been referred to—that was with reference to the duration of the retorts. Having had some connection with a kindred process requiring iron retorts, he had given much consideration to the subject of cracking; and he would just suggest to Mr. Young and Mr. Bell to consider the condition of their oil. In the manufacture of oil, it might be that there were acids; and it might be that those acids, acting upon the iron of the retorts, had the effect of, technically speaking, taking the life out of them, and rendering them liable to crack. With reference to what Mr. Whimster had said about the action upon the bottom of the retort, that was just one of the difficulties they had had long ago with iron retorts, in coal working; and they could not alter it, because the heat was always on one part. The only way to get over that, so far as he (Mr. Nelson) knew, was to have a revolving retort.

Mr. T. Douglas Hall (Montrose) had not had any personal experience whatever of the process; but he thanked Mr. Yuill for the very able paper that he had read, and would like to ask him a question or two. Had Mr. Yuill had any experience with incandescent gas-burners with the oil gas; also had he had any difficulty in supplying burners to consumers for properly burning the enriched gas; and also what was his experience with the gas in the public lamps? With regard to the cracking of the retorts, it struck him (Mr. Hall) that Mr. Yuill mentioned retorts heated internally. He had had some little experience of the working of iron retorts in England; and, although they used to have them very often burnt through, he did not think it was the general experience that the retorts cracked in the same way that they heard of the oil-retorts cracking. He was inclined to think, with Mr. Nelson, that there must be some chemical contained in the oil, which had some corrosive action on the iron, and so weakened them at the part where the oil fell on the iron. He, like Mr. Nelson, was going to suggest that the difficulty might be got over by, possibly, having a revolving retort. The internal heating reminded him of the calcining arrangement which he mentioned last year in his address which was used for treating copper and tin ores. He thought that, possibly if a retort were devised which was heated something after the plan of a steam-boiler, the difficulty might be got ever,

On looking over Mr. Yuill's table, he saw that, when using 91 per cent. of coal, the sperm obtained for 1d. came to 8 lbs.; and that, as the quantity of coal used decreased, the quantity of oil increased. So that, when they got down to 100 per cent. of coal, they only obtained 5 lbs. of sperm for 1d. This was all right enough; but if they put coal of different qualities in place of the coal and the oil mixture, they had exactly the same figures. As the quality of the coal was reduced, of course they obtained fewer pounds of sperm per ton; but if they looked at the next column in the table—the cost per candle power—they saw that it did not matter whether they used 91 or 100 per cent. of coal, the cost per candle was exactly the same. He thought that this was a feature in the case.

Mr. WHIMSTER said that the mention of the cracking of the retorts reminded him tnat he wanted to say something about it. At Perth, they had overcome this very simply, by a sheet of malleable iron, curved up like a scoop, drawn to the front of the retort, and going back about three parts of it. As the oil flowed forward, in a very small stream, it was vaporized, he believed, before it reached the retort. This arrangement had cured it with them; and he supposed it also disposed of the idea of acid being in the oil.

Mr. J. BOWMAN (Huntly) said he was a very young member of the Association; and the works he was interested in were quite small ones. He would, however, like to know if it would be advantageous to small works—making only three to five million cubic feet per annum—to adopt this process; because it would be a great matter to many small companies if they could get something which would enable them to make gas cheaper, on account of the competition they now experienced everywhere with paraffin lamps.

Mr. YUILL, in reply, said he anticipated that the criticism would have been more severe; but, as it was, he was thankful he had got so easily off. In Mr. Whimster's remarks, he was glad to find a corroboration of his own results. Mr. MacPherson mentioned the cost of labour. Well, as he had stated before, it depended on the coal they used, to a great extent. He could say this, that the cost of labour in making oil gas would be less per 1000 cubic feet provided the men were kept on for a full day's work. Mr. MacPherson mentioned residuals; but he thought that was thoroughly explained in the tables in the paper, which clearly showed the gross cost and the deduction for residuals.

The PRESIDENT said he understood that Mr. MacPherson took t' e figures in regard to the quantity of gas manufactured per ton, and endeavoured to prove that, if he required to produce the same quantity of gas in his works, in relation to the quantity obtained per ton, he would require to employ more labour than he did by using coal alone. Of course, the difficulty remained whether it would be the same with the higher priced coal.

Mr. YUILL said that was a question members themselves only could determine. If they found that they were able to get a certain volume of sperm at a cheaper rate than they would get it with coal, they were justly entitled to use it. Mr. MacPherson mentioned Russian oil in London at 3½d. per gallon. That oil, he thought, was of a more refined nature than the oil they were able to use in the Peebles process.

A VISITOR mentioned that in the price of 3½d. per gallon there was 1d. off for casks.

Mr. MACPHERSON: The 3½d. per gallon I gave, was the price of the oil pumped from tank-steamers.

Mr. YUILL said his information was that the oil at 3½d. per gallon must be more refined than that used in the Peebles process. There was an oil, he knew, that was used in some parts of America, which cost as much as 9½d. per gallon; and if their oil were to cost that, it would never pay them to use it. But the fact was that they had had the oil at 2d. per gallon; and the people from whom they bought were quite willing to enter into a contract to supply at that price for another three years. In his table, he had taken the percentage of coal and oil—the coal at 8s. per ton (it might be a little more this year, owing to the rise in the price of coal) and the oil at 45s. per ton. If Mr. Wilson, or any other member, would just work out the figures for himself, deduct the residuals, and then alongside of that take the cost of the coal, or cannel, or shale (the illuminating power being the same), they could at once determine the difference for themselves. He had given in the table the cost of the oil and coal less the residuals, for a given illuminating power; and he found the cost per 1000 cubic feet of gas made to be "so much." Then he gave the cost of coal and oil, less residuals, and found the net cost to be "so much." Members would require to do this for themselves. Mr. Hepworth asked about the relative charges for wear and tear. He could hardly speak on this point just yet, but from what he had experienced, if they had not been subjected to so much local heat, the retorts would have lasted for the next season perfectly well. He found that they had already made about 1,200,000 cubic feet of gas per retort, with some of them lying off for a considerable period; and he thought that, if all the retorts were working regularly, the make of gas might equal 3 million cubic feet per retort. Mr. Nelson spoke about the retorts. He did not know whether Mr. Nelson was speaking upon the paper, or just generally—he rather thought it was general; but, for himself, he did not consider the question of the cracking of the retorts at all, because the new form of Mr. Young's plant overcame this trouble altogether. They had had several incandescent burners in the town; and they found there was no difficulty in using them, because they were so adjusted that the gas suited the incoming flame. With 30-candle gas, they required to give less gas and more air. They had not heard of any complaints in the town regarding their ordinary burners since they began using the process; in fact, he never remembered any season when they had fewer complaints. They tried an incandescent gas-burner on one public lamp at the beginning of the season, and found it to work perfectly well; but they made a mistake in not having it protected from currents of air. There was no difficulty whatever in using 30-candle gas with incandescent burners. Regarding what Mr. Hall said about the sperm value obtained, he might say that, if the same results could be realized from cannel, he had not been able to get them. In his experience with coal, or cannel, or shale, the higher he went the more the cost became, and therefore the less sperm they obtained for 1d. The last column of his table gave the cost per candle per 1000 cubic feet, to enrich. The way he worked this out was to take 8·5 per cent. of oil at 45s. per ton, as the cost to enrich; and then divided by the total quantity of gas made from coal. This gave 0·301d.; and it was very strange that the same result worked out all the way down the column. As to the introduction of the process into small gas-works, this was a matter on which he could hardly venture to give an opinion. It was more a question for the patentees than for him. But from what he knew, he thought it could be practically employed in works producing about 5 million cubic feet of gas per annum, with an iron retort set in combination with a fire-clay one.

The PRESIDENT thought it was well that Mr. Yuill had kept the question of oil gas and oil enrichment separate from the question of enriching by either cannel or shale; because the cost of coal and of shale in different towns affected the working results very considerably. It might be cheaper in one place to use either shale or cannel; and it might perhaps be the reverse with oil. But they knew the cost of oil. The patentees of the Peebles process, he thought, certainly deserved the best thanks of the gas-consuming public; because not only had they provided cheap gas, but he was sure that the Peebles process had been the means of keeping the cannel market at what he might call a fair price. All round, therefore, they had benefited by the process. He had great pleasure in asking the members to accord Mr. Yuill a hearty vote of thanks for his paper.

The Flow of Gas in Pipes.—In a valuable communication extending over two recent issues of the *American Gaslight Journal*, Mr. J. P. Gill deals with the above subject, in continuation of an article on "Gas Combustion and Temperature" which appeared in that publication early in the year. Mr. Gill makes allowance for obstructions by tar, water, &c., tending to check the flow of gas through the pipe, which, he says, were not considered in the formulæ of Clegg and others. The new formula is as follows:

$$Q = 1291\ D^2 \sqrt{H\ D \div s\ (L + D)}$$

where Q is the quantity of gas in cubic feet passing through the pipe in an hour; L, the length of the pipe in yards; D, the diameter of the pipe in inches; H, the pressure in inches of water at the holder, or the pressure under which the gas enters the pipe; and *s*, the specific gravity of the gas.

The Strength of Brick Arches.—The strength of a brick arch having a span of 13 ft. 1½ in. and a rise of 1 ft. 11⅝ in. was recently tested near Beaune, in order to determine the suitability of such work in connection with a service reservoir under construction there. The arch had two rings of brick, measuring 11·8 in. by 5·1 in. by 1·2 in., laid flat with 0·4 inch of Vicat cement mortar between the rings and an 0·8 inch layer of mortar outside. A section of such an arch 2 feet wide was made in a rock cutting, and then weighted uniformly six days after it was built and three days after the centres were struck. The loading was 820 lbs. per square foot, and remained on the arch for 18 hours without crack or settlement. This was considered a sufficient test to warrant the adoption of the same construction on the proposed work. A detailed account of the matter was given in the *Annales des Ponts et Chaussées* for November last year.

Iron and Steel Institute.—The autumn meeting of the Institute will be held this year in Brussels, under the presidency of Mr. E. Windsor Richards. It is getting on for a quarter of a century since the members met in Belgium; the autumn meeting in 1873 having been held at Liége. The forthcoming meeting will commence on the 20th, and close on the 24th inst. The arrangements are being organized by an influential local Reception Committee, of which M. Gillon, President of the Society of Engineers of Liége, is Chairman, in connection with the General Secretary of the Institute (Mr. Bennett H. Brough). Upon the arrival of the members in Brussels on the 20th, there will be an evening reception by the Burgomaster at the Hôtel de Ville. There are ten papers down for reading and discussion—two, of leading local interest, being contributed by Belgian engineers. They are: "On the Coal Mining Industry of Belgium," by M. Briart, President of the Society of Engineers of Hainaut; and "On the Iron and Steel Industries of Belgium," by M. Gillon. Visits have been arranged to the Antwerp Exhibition, as well as to various collieries and works in the neighbourhood.

PACIFIC COAST GAS ASSOCIATION.

The First Annual Meeting of this Association was held at Sacramento (Cal.) on the 15th and 16th of May. The first year's working of this new Association shows healthy and satisfactory progress; the membership (including 20 new members elected at this meeting) having reached 76.

Mr. J. B. Crockett, of Sacramento, the President for the year, presided over a well-attended gathering, and, after the usual preliminaries, delivered an address. Speaking of the electric light, he said it was not yet sufficiently cheap in the district to be a dangerous competitor with gas at a reasonable price; but every gas manager should "get his house in order" to meet possible competition. An important matter which affected the members in California was the proposed change in the duty on foreign coals. Up to the present time, this had been 3s. 2d. per ton; and it was hard to have this tax in addition to heavy charges for carriage. They were almost the only State dependent on foreign coal; and they paid about 80 per cent. of all the coal duties in the States. There now appeared a prospect of getting this duty reduced to 1s. 8d. per ton. Under these circumstances, the discussion on Japanese coal at their previous meeting acquired increased importance. It was a somewhat troublesome coal to purify; but with boxes of ample size, the attendant difficulties could be overcome. The prospect of saving in cost of enrichers would render enlargements of the purifiers, if necessary, a wise expenditure. It was obvious why they could not make gas as cheaply as in the Eastern States. Coal cost more than double; and all their ironwork, retorts, meters, &c., had to be brought 3000 miles at exorbitant rates. The price of coal also depended on the value of wheat, seeing that most of their coal was brought as ballast by ships running to California for wheat. The President touched upon the question of leakage, and emphasized the importance of pushing the sale and use of gas stoves and engines. He concluded by giving his experience with prepayment meters.

The first paper read was entitled "Purification of Gas;" the author being Mr. E. C. Jones, of San Francisco. He said that the wet lime process was by far the more economical, as by it 14,000 cubic feet of gas could be purified per bushel of lime; and it was reluctantly abandoned on account of the difficulty experienced in disposing of the waste liquor. There were still some who kept to it, although most gas undertakings found dry lime preferable, notwithstanding the fact that only 5000 cubic feet of gas per bushel could be purified. For many years dry powdered lime was used; and it was not till Mr. Theobald Forstall, of New Orleans, read his celebrated paper in 1875,* that the proper way of preparing lime was known. Dry lime weighed 60 lbs. per bushel; but lime prepared as recommended by Mr. Forstall weighed 92 lbs. per bushel. The history of oxide purification was next touched upon. It was soon observed that oxide was powerless as regards carbonic acid; but against this it was found that lime removed some of the light-yielding hydrocarbons. The amount of carbonic acid remaining in gas purified with oxide only was about 2 per cent. The effect of limited quantities of this impurity had been overestimated; and its influence varied according to the quality of the gas. It was generally supposed that each unit per cent. reduced the illuminating power about 6 per cent. But Mr. C. W. Hinman investigated the subject; and he found that, with gases ranging from 19 to 23 candle power, the effect was from 1 to 3¼ per cent., and that the richer the gas the less was the effect. In 1887, Mr. Blodget, of Brooklyn, showed that gas purified by oxide was as good as similar gas purified by lime; the latter absorbing so much hydrocarbon as to neutralize the advantage of taking out the carbonic acid. It must also be borne in mind that the complete removal of carbonic acid by lime purification was a matter requiring skill, continual care, and well-designed apparatus. In making water gas, the formation of excessive quantities of carbonic acid could be easily avoided. At San Francisco, he prepared his own oxide; and the cost of purification was a mere trifle. He used four parts of sawdust, one part of slaked lime, and two parts of copperas, to which were added small quantities of iron borings and sal ammoniac. The chemicals were dissolved in water, and added to the mixed dry materials. This oxide was revivified *in situ* by means of a steam aspirator, and not removed until it had taken up from 40 to 50 per cent. of sulphur. He preferred aspiration to injecting air, either with or without steam, and to draw the air downwards, or in the direction opposite to that followed by the gas. One man was able to take entire charge of eight 25-feet purifiers; and once a month the covers were lifted, and the material, which was in layers at least 2 feet thick, turned with a spade.

Mr. Osborn read an interesting paper on "Small Things in Small Works," which led to an animated discussion as to lead *versus* cement joints for mains. It was claimed that cement made a tight joint, and that, if a leakage took place at all, it would be due to fracture of the pipe, and would be instantly detected. There were none of the small leakages such as those due to the "drawing" of lead joints. But, on the other hand, it was remarked that cement would not give at all in soft or yielding ground, nor would it allow for changes of temperature. In good ground, with fairly regular temperature, cement could be used to advantage.

* See JOURNAL, Vol. XXVI., p. 364.

Mr. T. R. Parker, of Napa, followed with a paper, entitled "How We Do at Our House," in the course of which he referred to the early days of gas lighting in the district, and then proceeded to describe his own works. He has a regenerator setting and "belted" retorts; having four belts moulded on so as to form one piece with the retort. They are about 8 inches wide, and so shaped as to join up to corresponding belts on neighbouring retorts, or to the walls, without requiring bricks or tiles. Other details of his apparatus, practice in laying mains, &c., were noticed.

Mr. Quilty, of San Jose, contributed a paper on "The Relations of Lighting Companies to the Public." He compared the position of gas undertakings with that of other joint-stock businesses, and said the lighting companies had no exclusive privileges, franchises, rights of way, or natural advantages. He regarded the examination of their accounts by representatives of the public as an encroachment on private rights that would, if generally applied, lead to what was known as "paternalism" in government—a thing which had always resulted in despotism. He regarded the spirit exhibited in the act of prying into and regulating the price of gas according to the whim of the public as one that was foreign to their Republican institutions. He referred in similar terms to the municipal control of gas or other trading concerns, and claimed that the public should not be too hasty in passing judgment on lighting companies.

"Proper Books of Record" was the title of a paper read by Mr. John A. Britton, of Oakland (Cal.). He described in detail a superintendent's handbook, giving full particulars as to dimensions, &c., of each piece of apparatus included in the plant; a carbonizing-book; and main and service books. He insisted on the importance of keeping a record as to the position of each service laid; a meter-book to include a complete history of every meter purchased, fixed, removed, tested, or repaired; and the usual rental-books, day-books, ledgers, &c. He concluded by urging the importance of not trusting anything to memory, but having a proper place for the record of every transaction. The paper elicited a long and animated discussion, which turned chiefly on the need for care and accuracy in regard to meters fixed or removed.

Mr. J. Kempf, jun, of Salt Lake City, Utah, contributed a paper dealing with "Foes to Mains and Services," among which he classed electric railway companies who did not provide a proper return circuit for all the current sent out, sewer contractors and employees, and the use of painted pipes. He preferred to paint the pipes himself, leaving a clear 4 inches on the spigot, so that there should be no paint between the lead and the pipe in the socket. The discussion that followed hinged entirely on the subject of electrolysis.

The "Question Box" was then taken in hand; the first question referring to the use of Japanese coal. Mr. Gregory found much trouble from stoppages in the hydraulic main, and also from sulphur, when using this material. Mr. Eichbaum said he did very well with two-thirds of Japan (Muke) coal and one-third of Greta or Wallsend coal. Mr. Eastland said that Muke coal made good gas and coke; but there was so much sulphur in it that he could not use more than 15 per cent. Mr. Jones found that Muke coal yielded 6 cubic feet of 16-candle gas, and Yubarri coal 5·7 cubic feet of 18-candle gas per pound of coal; so that it would often serve the purpose of an enricher. At San Francisco, half Japanese and half Greta or Wallsend coal was used. Several other questions were also discussed; and the business then closed.

OBJECTIONS TO THE ARRANGEMENT OF APPARATUS FOR WORKING IN PARALLEL IN GAS-WORKS.

We have received a reprint, in pamphlet form, of an article on the above subject, by Dr. W. Leybold, of Frankfort-on-the-Main, in the *Journal für Gasbeleuchtung*. The relative advantages of working each class of apparatus in series and in parallel are discussed; and useful deductions for the guidance of gas engineers are made. The fluctuations of make with the seasons of the year render the use of one large apparatus less convenient than that of two or three smaller ones. It must also be remembered that most appliances work better if their nominal capacity exceeds the maximum demand by at least one-fourth.

For atmospheric condensers, from 4·5 to 7·5 square feet of surface is usually allowed for each thousand cubic feet of gas passing in 24 hours; and for water condensers, rather more than 2 square feet. The dimensions vary for atmospheric condensers according to whether they are in the open air or in closed chambers; but the first variety—whether horizontal as in England, or vertical as is common in Germany—give less uniform results, since in winter the illuminating power of the gas is deteriorated, and in summer naphthalene is carried forward and subsequently deposited in the mains. The size of the purifier is determined by a velocity of 12 inches per minute for the maximum make, based on the lateral section of the vessel. The actual velocity of the gas will be considerably higher when the volume of material within the vessel is considered. All the vessels need not be of the same content, provided the cross section is the same throughout. Thus, to meet the exigencies of an existing building, two vessels may be square and the third oblong.

With regard to the working of two or more sets of each class of apparatus in parallel, the condensers may first be considered. Here the pipe from the hydraulic main would divide before the two sets of condensers, and the pipes leading from them would reunite. The condensers throw little pressure; and only in the case where the branching of the mains is far from one set would the stream of gas be unequally divided. The choking up of one set would naturally drive all the gas to one side; but such an occurrence may be easily discovered by means of pressure-gauges, or by the rise of temperature at the outlet. The exhausters follow the condensers; and generally more than one is preferred, as giving a more equable pressure. So far no objection can be raised to the plan of parallel working. The gas is next forced into two separate systems of tar-extractors and washers; each consisting, for example, of a Pelouze and Audouin condenser and a Ledig washer. The tar-extractor throws a pressure of about 2¾ inches; but in course of time the fouling of the bell will increase the pressure, probably unequally in the two sets, and that which throws the smallest pressure will take the bulk of the gas. The division of the gas may be again equalized by altering the balance-weights on one of the extractors, and so equalizing the pressure in the two sets. It is advantageous to occasionally cleanse the bell by means of steam —say, by passing steam in for about 20 minutes every Monday and Thursday—that is, until the temperature at the outlet reaches 95° Fahr. The cleansing will not, however, be equally effective on the two sets; and fluctuations in the volume of gas passed, first to one side and then to the other, will still occur. The height of the bell does not alter uniformly with the quantity of gas passing; and the amount of tar abstracted varies considerably, as was proved by Dr. Leybold in his paper on "The Removal of Tar from Gas."*

The unequal division of the stream of gas is less harmful to the work of the extractors themselves than to that of the washers which follow them. The Ledig washer works best when the liquor in the upper chamber is maintained at 0·1° Beaumé. Its efficiency is then about 99 per cent. From daily tests of the strength of the liquor at top and bottom, the supply of water is regulated. This method answers well for one washer. But with the double set described, the Pelouze extractor may at one time send very much, and at another time very little, gas to the washer attached to it; and the liquor in one washer may become very strong, and allow quantities of ammonia to pass out in the gas. The difficulty may be diminished by regulating the circulation of gas to each side by means of valves.

A common main takes the gas from the washers, dividing into two shortly before the purifiers, which may consist of two sets of three vessels each; the corresponding vessels in each set being of the same size. With all the vessels in action, the gas would divide itself equally between the two sets but with a vessel in one set shut out for recharging, the greater portion of the gas will pass through the two vessels in that set in preference to the three in the other. The result is that the excessive quantity of gas overburdens the two vessels, and unpurified gas appears at the outlet of that set. The streams may be equalized to a considerable degree by partially closing a valve on the one branch of the main, or by shutting out a vessel in both sets, when one in one set has to be thrown out of action for recharging. The stream of gas will often divide itself unequally between the two sets, in consequence of the accumulation of moisture in the material in the first vessel of one set; and since nearly the whole of the gas may, in consequence of the great pressure caused by the sodden material, be driven through the other set, it becomes necessary to at once put the defaulting vessel out of action, and to charge it anew.

In order to observe the pressure thrown by each vessel, it is desirable to have gauges fixed to all of them. Allowance must, of course, be made for the pressure thrown by the holder at the time the actual pressure due to a set is required. If each set contains four vessels, one of which is always kept out of action, the unequal distribution of the gas when a vessel in one set has to be shut off is avoided; but the length of time during which the material has been in the vessels, and an unequal degree of moistness, will affect the equal division of the gas in the same manner as with the sets of three vessels only.

The main from the purifiers leads to the station meter or meters. There is no disadvantage in employing two or more of unequal sizes, provided they are not worked above their nominal maximum rate. The gas passes from the meter to the holders, one of which is usually being filled, while another is delivering gas. The practice of working in and out of a holder simultaneously favours stratification, as Dr. Leybold has already pointed out.† Care must be taken, when working out of more than one holder at the same time, that the holders balance one another, or gas will be forced from the heavier into the lighter vessel, and probably out at the lute of the latter.

The disadvantages of having two sets of apparatus placed in juxtaposition for simultaneous working are very evident in the washers, owing to the unequal delivery from the tar-extractors, and also in the purifiers. They may be overcome in the first case by means of a bye-pass between the outlet-mains of the extractors, and reduced to a minimum in the latter by the use of four vessels in each set. Dividing the stream of gas among two sets is not disadvantageous to the remaining apparatus.

* See JOURNAL, Vol. LXII., p. 1125. † *Ibid.*, Vol. LXI., p. 1156.

THE MANCHESTER ELECTRIC LIGHTING SYSTEM.

At the Annual Meeting of the Institution of Mechanical Engineers, held in Manchester last week, a paper on the above subject, prepared by Dr. JOHN HOPKINSON, was read by the Secretary (Mr. A. Bache).

The author commenced by saying that it was now more than fifteen years since he had the honour of bringing before the Institution his first paper on "Electric Lighting." Since that time, this department of practical science had undergone an extraordinary development. Then the only electric lights were arcs; for the first incandescent lights in a practical form were not made until nearly a year later. Now there were many millions of incandescent lights in daily use. The machine experimented upon by the author in 1879 was what would then have been considered a fairly large one and highly economical. It required about 6-horse power to drive it. To-day there were many machines which had been working for a considerable time, requiring upwards of 1000-horse power to drive them. Then the commercial efficiency of the machine was about 50 per cent. To-day it was a matter of common practice to produce machines having commercial efficiencies of 94 per cent.

The system adopted in Manchester was a direct continuous current, with five conductors, supplying consumers at a pressure of 100 volts—the total pressure between the outer conductors being 400 volts. The conductors were partly bare copper in concrete culverts, and partly india-rubber insulated cables in cast-iron pipes. This arrangement of conductors was very similar to that which had been adopted in many other places; but it was in Manchester carried out on a somewhat more extensive scale—the Portland Street culvert containing a total area of copper of 9¾ square inches. The sectional area of the three intermediate conductors was small—only ¼ square inch for each; whereas the total sectional area of the outer conductors was no less than 4½ square inches. As might naturally be expected, such small intermediate conductors were in themselves inadequate to effect a perfect balance. The balance was therefore perfected by means of motor generator machines fixed in outlying parts of the system. Each of these machines was wound with two circuits, so that the pair contained four circuits, each being connected with two conductors of the five-wire system. The two machines being connected mechanically with each other by a coupling, any excess of current demanded from one section would be supplied by the circuit connected thereto, and the power required to effect this supply would be derived from one or more of the other circuits. As a compensating device, this arrangement was found to work perfectly. It did not claim any originality, as it had been in use some time in many places. Electricity could be supplied to consumers at four different pressures, according to their requirements.

The system of bare conductors had the disadvantage that the general insulation was poor; but this really caused no trouble, as it was a general small leak over the whole system, and did not tend to become worse. There was one curious fact in connection with this defective insulation; the insulation of the positive conductor was always good, while that of the negative was always bad. The fact had been generally known for some time; but the author did not realize its importance till he had experienced it. Electrolysis would deposit upon the negative conductor hydrogen from the moisture on the insulators; hence this exceptionally defective insulation was not calculated to injure the conductor. The explanation, so far as the author was aware, was not known. With the five-wire system, the troubles had been few, and all easily met; with the bare conductors there had been no troubles at all.

In the first instance, six engines and six dynamos, of about 100-horse power each, were put up, and also four engines and four dynamos of 400-horse power each. The six smaller dynamos gave nearly 600 ampères at a little over 100 volts pressure; the four larger gave 600 ampères at rather more than 100 volts. The engines were all of the vertical compound condensing type, and drove their respective dynamos by link belts, carried under jockey pulleys. The condensers were ejector condensers; the condensing water being lifted some 30 feet in order to give an adequate head. These condensers had been found effective—giving a vacuum of 25 inches; and they proved most convenient. The regulation of the electric pressure was effected by an adjustment of the governor while running. Two more engines and dynamos of 400-horse power, exactly like those already erected, had been ordered after the experience of last winter. The boilers were of Lancashire type, 30 feet long and 8 feet in diameter. At present they were six in number; but a seventh was being added. They worked at a pressure of 125 lbs. per square inch, and were fitted with mechanical stokers; and the water was heated by economizers. The steam-pipes, feed-pipes, valves, and economizers were all in duplicate. The boiler-house, 77 feet long by 70 feet wide, was covered from end to end by a steel water-tank weighing about 160 tons, constructed in seven compartments, and holding 205,000 gallons of water. In addition to the engines already on order, there was room for eight more large ones and five additional boilers. Hitherto no accumulators had been used; but, in the author's opinion, the present reduced price of these, and their increased durability, justified their introduction into

large stations as well as small. There would, of course, be no difficulty in adding them when it was desired. There were connected to the mains 18,600 incandescent lamps of 16-candle power, 250 arc lamps, and motors to the extent of 16-horse power. This was an encouraging result, when it was remembered that a preliminary supply on the two-wire system was begun only just a year ago. The average price to the consumer up to the 31st of March was about 5½d. per unit.

A discussion followed the reading of the paper; but prior to it, Alderman Lloyd Higginbottom gave some particulars as to the working of the undertaking. He said that at the end of five months the whole of the power that they had provided had been virtually taken up, and they had had to make a large extension for the next winter. Commercially they considered they had had a very satisfactory year's working. The cost up to now had been £130,000, including about £40,000 for the purchase of the land; and the result had been that for the five months' working the revenue was close upon £5000, while the debit balance was only £280. With regard to the power that was being put down for next winter, the demand was so great that it had already been taken up; and next year they would have to make a very large extension to meet the demands that would be made upon them. They estimated that they would have a revenue this year of nearly £25,000; so that instead of having a debit balance, they would have a very handsome balance indeed towards the rates of the city. If they had been a private company, they would have paid a dividend, because they had to provide first of all for depreciation at the high rate of 10 per cent., then for interest on the money borrowed, and then for a sinking fund to pay off the money. That, with all these three charges to meet they had only a debit balance of £280, they regarded as most satisfactory.

Presentations to Mr. T. de Courcy Meade.—Before leaving the service of the Hornsey Local Board to take up his position as City Surveyor of Manchester, Mr. T. de Courcy Meade received some material tokens of the regard in which he is held by those with whom he has been associated. The general staff presented him with a gold keyless watch; the Fire Brigade, with an oak-mounted salad-bowl and servers; and the workmen, with a silver-plated tea-keetle.

An Extraordinary Sample of Water.—In the *Chemical News* for the 6th inst., Dr. T. L. Phipson gave an account of an extraordinary sample of water he had received for analysis. A gentleman in the country sent him about four quarts of what he termed "drinking water from a new reservoir." The sample was colourless, bright, and clear, had no deposit and no odour; but it had a distinctly bitter taste and an alkaline reaction. It turned red litmus paper blue in an instant. This water, he was informed, was good for nothing. It was impossible to drink it; it cooked vegetables badly—depriving them of their colour; and when used for washing, it attacked the hands. It became milky when a current of carbonic acid was passed into it; and it contained a considerable amount of caustic lime—yielding to analysis exactly 100 grains of lime to the imperial gallon; but in other respects it was not rich in saline or organic matter. Having followed up the subject, Dr. Phipson learnt that no water was supplied to the house, and there was no well. The rain water which fell upon the roof was collected, and conducted by an iron pipe into a subterranean reservoir supplied with a pump. This reservoir had been lined with hydraulic cement, which was probably of bad quality, and yielded up caustic lime, sulphate of lime, and other salts in smaller amounts, and of less importance to the water. Dr. Phipson thinks the results point to the importance of such cements being submitted to very careful chemical examination before being used for reservoirs destined for the storeage of water for domestic purposes.

The Monier System of Construction.—At the last meeting of the Scandinavian Engineering Society of Chicago, the President (Mr. E. Lee Heidenreich) read a paper on the Monier system of construction, some particulars in regard to which appeared in the JOURNAL for the 26th ult. The author dealt specially with the following objections which have been raised to the system: (1) That the iron oxidizes in cement. (2) That the cement might not properly adhere to the smooth iron rods. (3) That there is a difference in contraction and expansion during changes of temperature. He stated that numerous experiments, undertaken with Monier plates, had failed to prove the correctness of these charges; and he instanced a few. At Amiens, a pipe-line built of Monier pipe was taken up after thirteen years' use, when the rods were as smooth as at the time of construction. The same result was found at Breslau in 1886, where Monier plates twelve years old were broken, and the rods found as smooth as new ones. In these experiments, it was ascertained that it took a tension of 2860 lbs. on a ¼-inch diameter rod suspended in a similar plate to tear it into two pieces. The tear occurred just outside the plate. In Berlin, a ¼-inch diameter rod could not be pulled out of a Monier plate 7½ inches thick, although the latter was heated to red heat, and a load of 2650 lbs. was attached to the rod. With regard to the third objection, the author stated that constructions on the Monier system had been purposely subjected to a temperature of as high as 1200° C., and immediately afterwards cooled off with water, without there being any perceptible effect.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

The Discussion on Mr. Chester's Paper on Regenerator Firing.

SIR,—I have only just read Mr. G. E. Stevenson's letter referring to Mr. Chester's paper at The Gas Institute meeting, on Regenerator Firing, where he points out that he ought to be named amongst the pioneers; and I quite agree with him. It is well known that he did supply me with some drawings of some foreign generator furnaces, which I put up with others; and he referred to these in the valuable paper that he read upon the subject some years ago at Birmingham. I did not erect any more of these furnaces, as they were not considered the most suitable for ordinary use, or I should no doubt have mentioned them. But, as Mr. Stevenson says, "let that pass."

The chief objection he makes to the remarks of Mr. Chester and myself is our preference for eight retorts, instead of nine, in a setting; and he points out that by the use of nine retorts, one gets 12 per cent. more carbonizing power in the same length of retort-house, and he sees no reason why they should not last as long. At the meeting, I pointed out that I had put up settings of both eight and nine retorts in a bed; and that, after very considerable experience, I found that far better all-round results were obtained out of settings of eight retorts, and that the life of these settings was very considerably more than with nine retorts, although the latter may be well and satisfactorily supported. I have also proved, to my own satisfaction, that it is quite a mistake to assume that one gets 12 per cent. more carbonizing power out of a bed by adding the ninth retort. Theoretically, there is no difficulty in setting or heating a bed of nine retorts in three rows; but before coming to a definite conclusion as to their advantage over a setting of eight retorts, all the circumstances in connection with their working must be taken into consideration. I believe I have a tolerably open mind; and if Mr. Stevenson or anyone else can prove that a setting of nine retorts has any commercial advantage over eight in a bed, I shall be glad to erect some when occasion presents itself.

This is no doubt a very important matter; and I am aware that there are differences of opinion upon the subject. I have made inquiries, however, and have been informed this afternoon by the Manager of the Bradford Road Gas-Works that the settings of nine retorts, recommended by Mr. Stevenson, have not worked (according to the books) anything like the number of days the settings of eight retorts have done in the same house; and that at the present time the settings of nine retorts referred to are being substituted by eight retorts in a setting. It, therefore, appears that Mr. Stevenson's own settings of retorts have been "weighed in the balance" against the eight retorts in a setting as formerly erected, and "found wanting." I shall, therefore, hope that Mr. Stevenson will, from this further experience, become a convert to our way of thinking.

Manchester, Aug. 3, 1894. JOHN WEST.

Mr. M'Gilchrist's Presidential Address.

SIR,—A presidential address is usually allowed exemption from criticism of a severe kind; but a word by way of comment may be permitted.

It is a pity to find a man of generally advanced opinions lagging behind on certain subjects. Mr. M'Gilchrist recites all the ancient arguments in support of his stereotyped views on the question of illuminating power, without advancing it one iota.

Perhaps we recognize as clearly as he (if it be not presumption to say so) the scientific value of the durability test and the illuminating power meter, whilst arriving at conclusions differing from his.

I was going to say that Mr. M'Gilchrist's views, and his remarks explaining them, are orthodox and eminently respectable; but, in presence of the fact—amounting to an object-lesson of the most fruitful kind—that the standard of illuminating power for Glasgow has been reduced from 25 to 20 candles (to the admitted advantage of all concerned), I cannot apply even that description to them.

One would have thought that, meeting in Glasgow, Mr. M'Gilchrist would have seized the opportunity of lecturing the gas authorities of the city on their reprehensible action in regard to the standard. But no; the Oracle was dumb! "South of the Tweed," says he in his address, "it has become quite fashionable to advocate a reduction in the standard of illuminating power." Stands Glasgow where it did? Did it not strike Mr. M'Gilchrist as he spoke, that Glasgow was our great exemplar in this respect? Why was the Oracle dumb? It required a good deal of assurance to be silent on the one, and so demonstrative on the other. Perhaps he did not care to receive the all-sufficing answer that would have been given to his strictures. What was good for his grandfather is evidently good enough for Mr. M'Gilchrist. A similar argument was employed by the Masters of the Inquisition in the days of Galileo.

It would probably be a waste of words to suggest to Mr. M'Gilchrist that in the photometry of the future—practised as it will be under improved conditions and with wider knowledge—light diffusion, as well as light intensity, will be considered.

Manchester, Aug. 1, 1894. THOMAS NEWBIGGING.

Illuminating Power and Illuminating Effect.

SIR,—There is a kind of "troubling of the face of the waters" which suggests to me that we are on the eve of important discoveries or modifications in the art and practice of photometry. It is quite certain that our knowledge, or assumed knowledge, on the question of the diffusion of light needs revising. For example, I do not find that amount of loss of light in the use of globes and shades which is stated in the text-books. Loss of intensity, as indicated by the standard photometer, yes! But not loss of actual lighting effect. On the contrary I find a decided increase of illumination by using opal globes.

Aug. 2, 1894. PROVINCIAL MANAGER.

Hirschfeld's Patent.

SIR,—I notice in the current issue of the JOURNAL a report of proceedings in Mr. Justice Romer's Court for the revocation of the letters patent for incandescent lights granted to Herr Hirschfeld; and I am more than surprised at some of the evidence given on that occasion by gentlemen who claim to be experts. I was present, by invitation, about December last, at an exhibition held at Palace Chambers, Westminster, when the general principles of manufacture were explained to me by a gentleman who was introduced to me as Mr. Hirschfeld. Being very much interested in what appeared to me to be a wonderful invention, I have made experiments of my own, purely as an amateur, with some of the materials claimed by Mr. Hirschfeld; and I say positively that, with a solution of combinations of certain of the materials claimed in his patent, I have been able to obtain brilliant incandescence from "filaments or threads" saturated in such solution, and subjected to the heat of an atmospheric flame, and these "filaments or threads" when heated are very flexible.

I think, therefore, that the public should bear in mind that the statements of these experts, although made in open Court, were made without fear of contradiction, and should not be accepted as gospel, but received *cum grano salis*.

AUGUSTO ALIMONDA.

69, *Lausanne Road, Hornsey, July* 26, 1894.

SIR,—Referring to your article in the last issue, and the reports of the proceedings in the High Court of Justice, we shall be much obliged if you will allow us to state in your columns that the Deimel Light Company, Limited, took no part in the defence of the proceedings against Herr Hirschfeld, and that the proceedings against Herr Hirschfeld are not connected with the action which is being defended by the Deimel Light Company. This action will not come on for trial until after the Long Vacation, and until the determination of that action, we hope your readers will suspend their judgment.

STEADMAN, VAN PRAAGH, SIMS, AND CO., Solicitors.

23, *Old Broad Street, E.C., Aug.* 4, 1894.

PARLIAMENTARY INTELLIGENCE.

PROGRESS OF BILLS.

In the House of Lords last week, the Harrow and Stanmore Gas Bill, the London County Council (General Powers) Bill, the Plymouth and Stonehouse Gas Bill, and the Thames Conservancy Bill were reported; the Cardiff Corporation Bill and the Colne Valley and Central Middlesex Water Companies' Bill were read the third time and passed; and the Accrington Gas and Water Board Bill and the Huddersfield Water-Works (Tramroad) Bill received the Royal Assent. In the House of Commons, the Consett Water Bill was read the third time and passed, with amendments.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Wednesday, July 25.

(*Before Mr. Justice* VAUGHAN WILLIAMS.)

In re the Barcelona (Besos) Water Company.

This was a petition for the winding up of the Company, presented by the Union Bank of Spain and England.

Mr. WARRINGTON appeared for the petitioners; Mr. ASHTON CROSS represented the Company.

Mr. WARRINGTON said the petitioners were creditors for £537. The petition first came on on April 4, when it stood over for a week or two for the purpose of answering the affidavits. It was subsequently stated that a firm offer had been made by a French Company to purchase the works; and on the 25th of April it was ordered to stand over for a month, on the usual undertaking by the Company. With reference to any other petition being presented, it was stated that the negotiations were in a fair way of completion. They were not concluded within the month; and on the 23rd of May the petition was again ordered to stand over for two months. On that occasion, an affidavit was filed, to the effect that the offer of the French Company had been definitely accepted by the Company in England; and a resolution was passed directing a formal contract to be prepared. The matter had recently been in the paper again; and it was stated that, if it stood for another week, everything would be arranged. They were still, however, exactly in the same position; and he must therefore ask that the order should be made. He understood that the suggestion was that the petition should stand over till October; but to this he could not consent. If the order were made, he did not see why the Liquidator would not be able to continue the negotiations, and carry out the contract, if there was one.

Counsel for other creditors supported the petition.

Mr. CROSS said he appeared not only for the Company, but also for debenture holders, who had a first charge on all the assets, and until they were paid the unsecured creditors could receive nothing. There would be very little chance of their getting anything if the order were made, as it would at once put an end to the pending negotiations. It was quite true that there was a firm offer by the French Company; but it was subject to getting the assent of the Spanish second debenture holders, who, under Spanish law, had power to seize the whole of the works and undertaking. The contract had been approved in Paris, and sent on to Spain, where certain delays had occurred. It had now been returned to Paris; and the only hitch was that the Spanish debenture holders were standing out for 100,000 pesetas, or about £4000, more than the French Company were prepared to give. Negotiations were proceeding, which would probably result in splitting the difference; and if the contract were carried through, the Company would be able, it was hoped, to pay all their creditors in full.

Justice WILLIAMS said there did not seem anything to necessitate the petition standing over till October. He would allow it to stand until the last day on which he took petitions before the Long Vacation; and he should advise the people who were standing out on each side to come to an agreement, or they would both lose the benefit they expected to get from the bargain.

Mr. CROSS hoped his Lordship would not decide now that, if the negotiations fell through, the winding-up order must go, because he was prepared to show that the enormous majority of creditors opposed it; and he submitted that their wishes ought to be consulted.

Justice WILLIAMS said Mr. Cross would have to be prepared with very satisfactory evidence on that point.

Friday, Aug. 3.

(*Before Mr. Justice* NORTH.)

Attorney-General v. Vestry of Camberwell.—The Bath Question.

In this case, the Attorney-General, on the relation of the Lambeth Water-Works Company, sought an injunction to restrain the defendants from contributing money out of the rates towards the costs incurred, or to be incurred, in obtaining a declaration of the law as to the right of the Company to make a charge for water supplied to fixed baths, or in doing any other act with the object of aiding persons to resist payment of any such charge. The relators are ratepayers in the parish of Camberwell, paying a large sum in respect of the general and other rates levied in the parish; and the defendants are the authority at whose instance the rate is levied. The parish contains about 38,000 houses, of which some 7000 are supplied with water by the Company, and 2600 contain fixed baths. The Company are not compelled, by statute or otherwise, to provide water for fixed baths in any houses within the district to which they supply water; but they are authorized to do so, if they have sufficient water for the purpose, on such terms and conditions as may be agreed upon. On April 11 last, in the action of *Walker v. Lambeth Water-Works Company*,* Mr. Justice Chitty decided that the Company were not bound to supply water for fixed baths except under special agreement, and upon such terms and conditions as should be agreed upon by them and the consumer. The Company had always been willing to supply water for fixed baths, at a uniform charge of 2s. 6d. per quarter. At a conference of Vestries and District Boards held to consider and report upon the charges made for water in South London, it was decided that steps should be taken to obtain a final declaration of the law on the matter; that, in the meantime, consumers should be advised to refuse to pay the charge; and that each Vestry should be asked to contribute to the costs incurred in obtaining such a declaration of the law, in proportion to the rateable value of the parishes taking part in the action. Considerable sums have already been expended, at the instance of the conference, in printing and circulating notices, with the object of raising the question of law; and the defendants agreed to contribute towards the cost. They alleged that the action of Mr. Walker was a friendly one; and that the matters at issue were not fully argued. They further alleged that the question of the right of the Company to make a charge for fixed baths was of public importance to the parish and the ratepayers and inhabitants thereof, by reason of (1) the defendant Vestry being the Sanitary Authority of the parish charged with the duties created by the Public Health (London) Act, 1891; (2) the expenditure out of the rates under the Acts for the establishment of baths and wash-houses being increased, and liable to further increase, if the bath charge was warranted; (3) the increased charge which would be thrown upon the rates upon the taking over of the Water Company by the London County Council, if and when effected, if the bath charge was warranted; and (4) the importance to the inhabitants of the parish of securing a proper and sufficient supply of water, and of removing any obstacle to such supply. Under these circumstances, the Vestry submitted that the application of the general rate in the manner complained of was proper; and that they were entitled to apply a reasonable and sufficient sum of money out of the rates for the purpose.

Mr. SWINFEN EADY, Q.C., and Mr. YATE LEE appeared for the plaintiffs; Mr. S. HALL, Q.C., and Mr. P. C. STOKES represented the defendants.

Justice NORTH said he thought the Vestry were wrong in the course they had taken. The question whether the Water Company could legally make a charge for water supplied to fixed baths had been decided by Mr. Justice Chitty after full argument; and, as there had been no appeal, it must be taken that the law upon the point had been settled. It was now said that the Vestry desired to have the matter fought out again. If so, there was nothing to prevent any person who considered he was improperly charged from taking action in a legitimate way, and from adducing any fact which ought to have been brought forward in Walker's case. But this was not what was now complained of. The Vestry were promoting an agitation for the purpose of resisting what had been decided to be a lawful claim, by inducing people to take water and refuse to pay for it. In his opinion, the Vestry were not justified in employing money out of the rates for the purpose of assisting others to get rid of a decision of the Court. The Vestry were really starting a "plan of campaign," which could not be said to be a lawful public concern; and therefore the injunction must go, as asked.

The London County Council and the Water Question.—At the offices of the London County Council, on Monday last week, a conference was held between the Water Committee of the Council and representatives of certain Local Authorities, to discuss a special phase of the water question. Mr. A. Bassett Hopkins, the Chairman of the Committee, was appointed President of the conference, and a large number of representatives were in attendance. The question under consideration was the conditions under which water should be supplied to areas outside the County of London, but in the Metropolitan Water Companies' areas. The meeting was of a private character; and the conference was adjourned without result—it being resolved that no decision could be come to until the Council's Water Bills were in a more advanced state.

* See JOURNAL, Vol. LXIII., p. 714.

MISCELLANEOUS NEWS.

THE GASLIGHT AND COKE COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held at the Chief Office, Horseferry Road, Westminster, last Friday—Colonel MAKINS, the Governor, in the chair.

The SECRETARY and GENERAL MANAGER (Mr. J. W. Field) read the notice calling the meeting; and the report of the Directors, which was given in the JOURNAL last week, was taken as read.

The GOVERNOR, in moving the adoption of the report and accounts, observed that it would be in the recollection of those who attended the meeting six months ago that he ventured to state that he thought they had turned the corner; and the shareholders would no doubt agree with him in thinking that the accounts and the report fully justified this belief on his part. For the first time for a good many half years, they had been able to recommend their full statutory dividend, and also to carry a very substantial sum to their undivided profits. He would go through the salient points of the half-year's work, and make a few general remarks on gas politics. With regard to their capital account, the amount spent last half year was very small—in fact, they were getting very near to closing their capital account, unless some very large increase of business should compel them to add to their plant. They were in a very good position with respect to the supply of gas, and were quite prepared for a very foggy winter, which, in the interests of the proprietors, though not of the community, he hoped they would see. The sum they had spent was £57,000, representing about half the amount of unpaid contracts they had entered into with respect to the extension of works at Beckton and elsewhere. The expenditure had been £14,500 for the pier and machinery at Beckton, £12,000 for the railway and viaducts, £14,000 for purifier-houses and plant in connection therewith, and £3500 for sundries. At Bow Common they had put down ammonia plant, &c., at a cost of £5000; and the extensions to their liquor-works had cost £4000, while sundry extensions at other stations had involved an outlay of £4500. The rate per ton of coal carbonized stood at £6 5s. 7d., against £6 6s. 3d. a year ago. This was a very slight diminution; but it was a movement in the right direction. There would be no further capital outlay for the next year or two; and as they were looking forward to a renewal of business and a greater demand for gas, this figure of capital per ton of coal carbonized was likely to be reduced. As regarded income, the gas-rental was less than in the corresponding period of the previous year by £7750; and the actual reduction in the quantity of gas sold was about 0·3 per cent. There had been in the last half year the same marked correspondence between temperature and sunshine and the demand for gas which had been noticed on former occasions. In the March quarter, there was a slight increase in temperature, and a large increase in the recorded sunshine; and the gas sold fell 4 per cent. In the June quarter, there was a decrease in temperature, and a considerable decrease in the number of hours of sunshine recorded; and the gas sales rose 6½ per cent. Therefore, what he had put forward on several occasions from the chair, was constantly proved to be true—that the increase or decrease in their sale of gas did not depend mainly on the competition of the electric light or other causes, except, of course, the natural economy which must be practised in hard times. For the month of July, he might say that the weather had been more or less normal. They had St. Swithin's, the dog days, and plenty of rain; but the temperature in July had been about normal, and the increase in the gas sold had been just under 1 per cent.—still continuing to prove the case he had put forward. There had been a satisfactory increase in the number of stoves let out on hire. This would be a more profitable source of revenue if the consumers took a little more care of the stoves lent to them, which were sometimes returned in a shameful condition. He mentioned last half year that they had not then made a beginning with the automatic prepayment meters, generally called the "slot meters." They had, however, now made a commencement. He still did not feel exceedingly sanguine about the result; because in the case of the small dwellings, where they had put in the fittings, the result had not been what they had hoped for. But they thought it right, seeing that other companies were using these meters to an increasing extent, that their own Company should make the experiment in the poorer parts of their district. He hoped (not next half year) a year hence to be able to tell them what the result of the experiment was. There had been a small increase in the item of meter-rental, and a very satisfactory increase in the item of stove-rental—together amounting to £867. This was not a large amount; but, again, it was a movement in the right direction. He now desired to make an announcement which he hoped would be regarded with satisfaction, not only by their shareholders but by the consumers and the public at large. It was this—that when their neighbours the South Metropolitan and the Commercial Gas Companies saw their way to abolishing meter-rents, they were themselves prepared to abolish them. Meter-rents at present brought the Company an income of £58,000 a year; and to give this up, would entail on them a loss of revenue of about 3s. per cent. But he had no doubt that it was a good policy to adopt. There was special reason in the case of their Company why they should adopt it; because in the City they did not charge, and never had charged, meter-rent. He did not know what their neighbours might do; but, as he had said, if they would abolish meter-rents, The Gaslight and Coke Company would do so. But they could not do so unless their neighbours did, because in that case they would put themselves at a still greater disadvantage than they already occupied as regarded difference of charges. With respect to coke, they had had a most satisfactory half year; and the half year on which they had recently entered promised to be equally satisfactory, if not more so. The revenue from this source showed a material improvement, when compared with the figures of the June half of 1893. The stations in town had obtained considerably enhanced prices all round; but Beckton (the Company's largest station) only participated in the improvement to a small extent. It was, however, satisfactory to be able to report that the contracts made the previous week for the sale of Beckton and Bromley coke for the coming season were at very much better prices than those of any recent years. The net increase for the half year was 1s. 3d. per ton of coke. The market for breeze had also improved. Tar had not yielded quite so well as in the June half of 1893, although a little better than in December last. He thought that the falling off was distinctly attributable to the unsatisfactory condition of trade here and on the Continent; and to the differences in regard to the tariff question in the United States. He hoped that they would soon see a little improvement in tar. As to ammoniacal products, the amount they had received on this account in the half year was £98,017, which was the largest on record; and its equivalent per ton of coal carbonized (2s. 1¼d.) was the highest figure touched since 1883. He was glad to be able to state that there did not so far appear to be any immediate prospect of a reduction in market value. The return for the half year from ammoniacal products would have been even better had it not been that the cost of reconstructing the sulphate plant (originally erected in 1879) on more modern and economical principles, was being charged to this account. He only mentioned this because he believed it was not the practice in some companies to charge these renewals to the sales account of the products. He was reminded that the price of ammoniacal liquor—and particularly of sulphate of ammonia—although very high now, was, comparatively, nothing in comparison to what it was some years ago. They had had as much as £20 per ton; but the price had been as low as £9. The present price might therefore be regarded as very satisfactory; and they now realized much more out of the liquor itself. With regard to all their residuals taken together, the total improvement for the half year was equal to a reduction of 1s. 2¾d. on every ton of coal carbonized. With reference to expenditure, they had again to point to a "record price" as regarded coal. The total cost—including wages, the heavy lighterage dues payable in respect of their canal stations, and the cost of enrichment both by cannel and oil—was 11s. 2·18d. per ton of coal. If they deducted from this amount the 8s. 7·77d. which they had received for residuals, they arrived at the net cost of their coal in the past half year—namely, 2s. 6·41d. per ton, which was a price they had never before reached. Of course, this result was mainly owing to the low price at which they made their contracts in 1893, and to the high price of coke. Unfortunately, they could not look to repeating this experience, because in the present half year they had had to deal with the combination of coalowners in the North of England to which he referred six months ago. The result had been that they had had to pay between 1s. 3d. and 1s. 4d. per ton more for coal than they did last half year. He would not say anything about this at present, beyond stating that if it had not been for having to pay this additional price for coal, they might have made a further reduction of 2d. per 1000 cubic feet in the price of gas. Whether or not the combination would continue, he could not say. When he spoke about this matter before, he ventured to say that there would be "leakages;" and he was inclined to think that it had been very difficult for the combination to prevent their members from making contracts outside. If the combination continued, the Company would probably have to pay something like the same price, or perhaps a little less, next year. It was right that the proprietors should be assured that the reduced cost of gas in the past half year had in no case whatever arisen from reducing the illuminating quality or the purity of the gas, which had been sent out on all occasions at the maximum illuminating power and of the prescribed quality. Although the carbonizing wages were higher than they would have been but for the slackness of the demand for gas in the winter, there had been a slight decrease in the cost per ton of coal. The men were working very well indeed, and were giving great satisfaction. At the same time, having in view the arduous nature of the work performed by the stokers, the Directors were still putting in labour-saving appliances wherever they could do so, with the view of making the work less laborious, and also of effecting a saving in cost. The wear and tear in the past half year had been slightly lower than in the June half of 1893; but the Directors attached great importance to maintaining the whole of their works in the highest state of repair. They might save a little on this head. But it would be doubtful economy; and, at any rate, it had always been their policy to keep their plant in the most efficient condition possible. The distribution charges were a little higher; but this arose from the excess in the item of stove fixing. As, however, this was a remunerative outlay, they did not object to see the item standing a little higher. Taxes showed an increase of £6000, which was accounted for partly because of the extra 1d. on the income-tax, and because the rates in the pound were 2¾d. more than they were a year ago. The rates and taxes had a constant tendency to increase; and he did not think it would ever be in his power to announce a reduction in them. In Parliament this year, besides minor Bills, they had had the Thames Conservancy Bill and the London County Council (Streets and Buildings) Bill. These were the two principal Bills that had affected them; and they had gained a substantial advantage in opposing the latter Bill, by getting the Metropolitan Gas Companies excluded from the operation of a considerable section of the measure which applied to buildings in the Metropolis. The law charges were now reduced to a normal figure; and with regard to bad debts, an improvement of £1000 was shown as compared with last year, which, however, was exceptionally bad. The net result was that they were able to ask the proprietors to declare a dividend of 12 per cent., which was the maximum statutory rate, and to add £177,847 to the balance brought forward from 1893. This would make a total of £239,972; and if they added their reserve fund of £124,065, they brought up the total available reserve to £364,000, which was equivalent to about 4·73d. per 1000 cubic feet. They had also the right, if they had chosen, to carry to their insurance fund a portion of this, up to 1-20th of the profits of the year; and they would have been perfectly within their right had they done this before they lowered the price. They were, however, anxious to reduce it, although not on account of any agitation; for they had, as he had said, kept within the terms of their Act of Parliament without pressure from outside. They might have postponed the reduction a little longer had

they increased their insurance fund; and to this extent they had made a concession to the consumers. It might be said that this was a very large amount of reserve to have in hand. A great deal of it would, of course, be absorbed by the reduction in price which they had announced; but the advantage of having such a reserve—not to the Company, but to the public—was very great, as they would see when he laid the facts before them. The net increase in the cost of the Company's working for the five years from 1889 to 1893, as compared with the year 1888, amounted to £855,000; and the additional capital charges had been £166,000—a total of £1,021,000. This had been met by a reduction in the rate of dividend paid, amounting to £98,000; they had withdrawn from the reserve fund £427,000 (crippling their reserves to this extent); and they had reduced the undivided balance by £242,000. These three items together amounted to £767,000 out of the £1,021,000. On the other hand, the consumers had only had to pay £254,000 by the increase in price charged to them for their gas. The possession of these reserves—which had sometimes been called "bloated balances"—was not at all undesirable, even in the interests of the public themselves, because in case the cost of producing gas rose, they had something to fall back upon before they were compelled to increase their price. As regarded their reserves, from the 1st of January this year the aggregate value of the reserve fund and undivided profits was equal to 2·43d. per 1000 cubic feet; but there was now a large rise in this—to 4·73d. Out of this 4·73d., they would give on the 1st of October next the reduced price they had announced, as well as 1d. given on the 1st of July; the Company retaining the balance. As he had stated, on the 1st of January last, the aggregate value of their reserve fund and undivided profits was 2·43d. per 1000 feet, while in the case of the South Metropolitan Company it was 2·50d., and in the case of the Commercial Company it was 6·69d. It had been said that they ought to have antedated the reduction in the price of their gas. But they would not have been justified on the 1st of January last in doing so even by 1d.; although he had hoped that this might have been the case. They went into the question thoroughly; but they did not know what the action would result in as regarded the increase in the price of coal. They, therefore, at that time refrained from making any reduction. But immediately they had settled their coal contracts, and they had an increased return in rental from the worse weather experienced in the second quarter of last half year, and they saw that residuals were not only maintaining but increasing their price, they announced the further reduction; and he hoped it would be received with general satisfaction. It might be as well that he should remind the proprietors that, under the sliding scale clause, they would obtain no advantage from the reduced price of their gas until next year; but they would then be entitled to declare ¾ per cent. per annum more than they did at the present time. The increase in their dividend would not begin until the 1st of January next; whereas the consumers would get the first reduction as from last month, and from next October they would benefit by the two reductions to the extent of £80,000. This was the way in which they had read the sliding-scale. If the price was lowered in any one year, it must be for a whole year (and not a portion of the year) before they could claim any increase of dividend. He would have been glad if he could have ended his remarks at this point. Outside the question of the working of the Company, the most prominent feature during the half year had been the continued agitation with respect to the price of gas—the difference in price as between the north and the south sides of the Thames. The agitation had been continued by Mr. James Rowlands, M.P., and certain other gentlemen associated with him; and it had culminated in the action of the London County Council, who had, on the report of their Chemist, resolved to ask the Board of Trade to initiate an independent departmental inquiry as to the working of the sliding-scale; and, in addition, as to the question of gas enrichment and the desirability of testing by portable photometers. With regard to the price-agitation, it would be in the recollection of the shareholders that he dealt with the question very fully from the chair last February, and gave statistics showing the causes which produced the difference in price as between the South Metropolitan Company and their Company, and assigning to each item the amount attributable to it in favour of the Southern Company. He pointed out their charging two prices was not the arbitrary action of the Company, but was a legal obligation put upon them at the time of the amalgamation with the London Company. At the request of the meeting, these figures (with a carefully compiled statement) were issued to the proprietors, to the public authorities, to Mr. Rowlands, and, in its original form, it appeared in the JOURNAL OF GAS LIGHTING on Feb. 13—that was, the day before the South Metropolitan Company's half-yearly meeting. From that time to the present, the agitation had gone on; but, though the statement and figures had been slightly alluded to, on no single occasion had any speaker or writer ventured to challenge any assertion contained in it, or any of the figures adduced in support of any such assertion. The statement therefore still stood unchallenged and uncontradicted. A considerable amount of force was added to the agitation by a paragraph in the address of Mr. Livesey, the Chairman of the South Metropolitan Company, to the shareholders of that Company at their meeting held on Feb. 14. He (Colonel Makins) would not have referred to this, but that it had become public property, by having been quoted in the report to the London County Council, on which that body had come to their determination to apply for an inquiry. He would read to them what Mr. Livesey said on that occasion: "He had been very sorry to hear, in the comparisons which were made at the meeting he had referred to last week [that was the meeting of The Gaslight and Coke Company], that it was attempted to show where the difference lay between the two Companies; but not one word was said as to the cause of the difference. It was a very clever accountant's statement; but it showed a total want of capacity for management. And the only other remark he had to make about it was that the whole gas industry of London was suffering because of the want of capacity of managing the business where the gas was being supplied at 3s. 1d. There was no reason why the Company which supplied the finest district in the world should not sell gas as cheaply as it was sold in less favourable parts." This speech of Mr. Livesey's was the more important because it was embodied in the London County Council Chemist's report, and it was used as an argument—indeed, the most powerful of the arguments—for inquiry. He was very sorry that Mr. Livesey had made such a statement. It had always been the wish of himself and his colleagues to live at peace with all men, but more especially with those engaged in similar industries to their own. But what did the speech of Mr. Livesey amount to? It did not directly impugn the statement which he (Colonel Makins) had made; but it sneered at it as a clever accountant's statement, and made the astounding assertion that nothing was said about the causes of the higher price; whereas the statement was a catalogue of causes, supported by figures taken from the published accounts of the two Companies. Mr. Livesey said there was a total want of capacity for management in The Gaslight and Coke Company, and that all London suffered in consequence. This might be Mr. Livesey's opinion; but he (the speaker) thought evidence should be furnished in support of such an opinion. What he complained of most was this: It came from a gentleman in Mr. Livesey's position, not from an ignorant vestryman, a confused county councillor, or a political agitator, but from an astute and able gas manager—perhaps the most astute and able manager—who knew well, or could know well, whether or not the statement he put forward was true. Mr. Livesey had ample opportunity of going into the facts, and putting forward a counter-statement, showing where his (Colonel Makins's) statement was wrong, if it was wrong. Nothing of the kind had, however, been done; and the Directors of The Gaslight and Coke Company had remained for six months under a charge of want of capacity, and of having conspired with their officers to put out a bogus statement which they knew to be false, in order to throw dust in the eyes of the consumers and of the public. He considered it a disgraceful insinuation. He was glad to see Mr. Livesey present, and they were ready to hear if he could support what he had said; or if he was not prepared to do so, perhaps he would withdraw and apologize. Since he (Colonel Makins) entered the room, he had received a very nice letter from Mr. Livesey, to whom he had given notice of his intention to bring this matter forward. Mr. Livesey stated that he was desirous of having friendly relations with The Gaslight and Coke Company, on whose part he (the speaker) could say the same. Mr. Livesey, however, made a little condition with respect to the resumption of their "friendly relations;" but he thought he would be able to show Mr. Livesey that this was an impossible condition. The shareholders would remember that there was a little difference between the two Companies about the supply to the Railway Company at Nine Elms, and that they had to go to law about it; the result of the action being that they won it, and the South Metropolitan Company lost it, and the Court ordered costs to The Gaslight and Coke Company. Mr. Livesey was under the impression that the shareholders of their Company were in favour of the Directors remitting the costs to the South Metropolitan Company.

Mr. GEORGE LIVESEY: Not costs; but damages.

The GOVERNOR said he had explained more than once that it was not in the power of the shareholders, or any section of them, to give away this money, which had been awarded by the Court. It was part of the assets belonging to the shareholders, and neither the Court nor any section of the shareholders had the right to say to Mr. Livesey: "The Court has given us costs, but we will hand them back to you." If, however, they could have done this, it would have been most agreeable for them to have done so. There had been nothing on his part, nor on the part of his colleagues, of a spiteful character in connection with the action which they had been obliged to take in the matter in question. He had been very glad to see that, in the letter referred to, Mr. Livesey held out the hand of good fellowship; and he and his colleagues would be only too happy to grasp it. It was pitiable that they should be compelled to speak against one another; and he believed that no one would regret more than Mr. Livesey, on reflection, that he had conveyed—probably unintentionally—an undeserved imputation on the good faith of the Directors of The Gaslight and Coke Company. He now came to another phase of the agitation, which was carried on at a meeting held at the Holborn Town Hall on the 18th of April. He saw the announcement of this meeting, and, in fact, he received a note from the Secretary of the League asking him to attend and explain. He wrote back to the Secretary to state that he could not, in justice to his Company, appear at the meeting, as it would be a confession on his part that there was some justification in the attack. He, however, furnished the Secretary and Sir Albert Rollit (who had been announced to take the chair at the meeting) with a copy of the statement, with a print of the "Memorandum" issued to the shareholders, with a copy of the letter sent to the local authorities, with the Company's Acts and the Amalgamation Scheme, and with a copy of the analysis of their accounts. He received a courteous acknowledgment from Sir Albert Rollit, who said that he would take an opportunity of making himself master of the figures and information forwarded to him. But when he was at the meeting either he had not had time to do so or had forgotten all about it; and he spoke as if he had not looked into a line of the papers that had been sent to him. This was what Sir Albert Rollit said: "I have one remark only to make, in addition, and that is in relation to what I find is a constant feature of the explanations of The Gaslight and Coke Company, and that is that the whole loss, the increased cost, the differential price must all fall upon the consumer. That if wages go up, the consumer must pay them; that if coals are dearer, the consumer of gas must pay the additional cost." Then Sir Albert when on to say: "But when I hear it said that, in these matters, the Board of Trade were originally parties to the statutory arrangement which exists at present, I cannot help thinking that the Board of Trade, as a public department, ought also to have a constant regard to the rights of the consumer, and that his interests ought not to be lost sight of in these days of keen and constantly increasing competition." Sir Albert Rollit, who took the chair at a meeting held to inquire into this matter, had not made himself acquainted with the fact that the Board of Trade had a continuous audit and went into every book which the Company had. This display of ignorance was to his (Colonel Makins's) mind perfectly lamentable in a public man. The Directors could not issue accounts to the proprietors until they had been seen by the Board of Trade. With respect to increased cost, differential price, and increase of wages and in the price of coals, he had informed them of what Sir Albert Rollit said at the

meeting—that the consumers must pay. This was a point which a man might not be informed upon; but if Sir Albert Rollit would read what he (the speaker) was now about to say, he thought he would regret the statement he had made. In the case of their Company, the aggregate increase of profit made since 1877 (the date of the operation of the sliding-scale) had been £11,020,000. Out of this, the consumer had obtained, by way of reduction in the price of gas, 85¾ per cent., or £9,425,000; whereas the shareholders—who, Sir Albert Rollit had said, got everything, while the public got nothing—had had, in increased dividends, 14¼ per cent., or £1,595,000. In other words, the consumer had had seven times as much as the producer. He (the speaker) might state that about the same result was the case with the South Metropolitan and the Commercial Companies, the figures relating to which he also quoted. Taking the whole of the Metropolitan Companies, there had been an increased profit since 1877 of £16,978,000. Of this amount, the consumers' share had been 84¼ per cent., or £14,369,000; while the shareholders had had 15¾ per cent., or £2,609,000. He thought that these figures were a conclusive answer to Sir Albert Rollit and also to Mr. Naoroji. Mr. Naoroji seemed to be rather in the dark on the subject, for he said: "If there was anything which we could have expected with this United Company (for it was united afterwards), it would be that, with the largeness of their extension and with the smallness of the necessary staff in proportion, they would have reduced their expenditure, and consequently have reduced the price of gas, which they have not done." What, however, were the facts? The Gaslight and Coke Company had reduced their price by 11d.; the South Metropolitan Company, by 11d.; and the Commercial Company, by 15d. These irresponsible statements, which were made by public men in public meetings, were published in the public Press; and their general meetings were the only opportunity the Companies had of refuting and exposing them. The County Council had adopted the Rollit and Naoroji programme, and were going to the Board of Trade to ask for an independent inquiry. Six months ago he said, and he repeated it now, that their Company did not object to independent inquiry except for the expense, annoyance, and trouble; but they maintained that such an inquiry was totally unnecessary, because of the continuous audit to which he had referred. There was nothing to inquire into which was not known to the Board of Trade, and which might not be known by the public. There was, however, another little difficulty of which the County Council were not aware—that, as far as he (the speaker) could see at the present time, after going through their Acts, there was no power to compel the Company to afford information. Such powers of the Board of Trade were repealed, and the power was given to them of a continuous audit; the Company now working under the Act of 1876 (the sliding-scale and auction-clause Act). He thought that it was probable that the Law Officers of the Crown, therefore, would advise the Board of Trade that there was not only no need but no power for holding such an inquiry. In conclusion, he remarked that he had been glad to present the shareholders with a favourable account of the half-year's working, because it had been a little uphill, and no one rejoiced more than the Board when they were able to make a good statement, and hold out the prospect of an increased dividend, as they could do now.

The Deputy-Governor (Mr. Howard Charles Ward) seconded the motion.

Mr. George Livesey said he supposed that, after the remarks of the Governor, it was impossible for him to be silent, as he had intended and wished. With reference to the question of meter-rents, it seemed that, having lost these rents in the City, the Company, like the fox that had lost its tail, was endeavouring to persuade the other Companies to cut off theirs. It came to this, however—that the consumer must pay for the meter in meal or in malt. If he did not pay the meter-rent, he must pay 1d. per 1000 cubic feet more for his gas; and if they took off the meter-rent, they would charge 1d. more for their gas, or not be able to reduce the price to this extent when they otherwise could do so. He thought it would be bad policy to add 1d. to the price by taking off the charge for the meter. With regard to other matters, he was very sorry to be in such a position; but the Governor had challenged him, and he supposed he must take up the challenge, though it would not be in an unfriendly spirit. One reason for making, at the last meeting of the South Metropolitan Company, the remarks referred to by the Governor, was the disparaging observations made by the latter last February as to the capacity of the South Metropolitan Company's works. Inferentially, it appeared from what was said by the Governor on that occasion that the South Metropolitan Company were relatively deficient; but he maintained that his Company had quite as great a surplus power as the Chartered Company.

The Governor observed that what he had said was as to the question of the load factor; and his remark was that the load factor of their Company was greater in proportion than that of the South Metropolitan Company.

Mr. Livesey said he would challenge that statement. Take one of the most costly parts of gas-works plant—gasholders. The South Metropolitan Company had gasholders equal to 130 per cent. of the maximum demand; and the Chartered Company had nothing like that. They had more gasholder storeage considerably, in proportion, than the Chartered Company. With regard to the question of management, he had not charged the Governor individually with want of capacity or of management; but it had been common knowledge in the gas industry for the last twenty-five or thirty years that incapacity had marked the conduct of the Chartered Company all through; and the way they had succeeded in placing themselves in their present position had been by absorbing six or seven other Companies, each of which was in a better position than the Chartered Company.

The Governor asked whether this was evidence of incapacity.

Mr. Livesey said he had always stated that the Company were indebted to an enormous extent to Mr. Phillips for the ability with which he carried through the amalgamations; but his (the speaker's) remark as to incapacity was more in reference to the expenditure of capital and management. A great deal more was laid out at Beckton and other places than need have been spent. The charge for capital, as set out in the statement of the Chartered Company, amounted to 13·82d. per 1000 cubic feet, against 11·64d., which was that of the South Metropolitan Company; and he maintained that this was evidence of extravagance.

The Governor pointed out that there was no reference to this matter in his statement.

Mr. Livesey said he held by what he had stated, which would be scrutinized by men who thoroughly understood the matter. If the Chartered Company had not an excess of plant over the South Metropolitan Company, he did not see where they could account for their excess of expenditure. Then with respect to rates and taxes. He knew something about what was done at the last quinquennial valuation. He knew that the Chartered Company were settling their rates with the different Vestries at something like 10 per cent. on the rental; and he had it from the Surveyors themselves that the whole might have been settled at or about this figure. The Directors, however, were ill-advised, and contested the matter, and spent about £20,000 in law charges; and the result was that their rates and taxes were put up by 14 or 15 per cent. on the rental, whereas the other two Companies settled theirs at about 10 per cent. The Governor had said that the rates and taxes had been diminished by this expenditure; but he (the speaker) happened to know the whole amounts spent on rates and taxes for some years. In June, 1889, the Chartered Company paid £79,000; and in June, 1894, £92,000. The great jump was after the appeals; and he had always said that, if good capacity for management had been displayed at that time, the Chartered Company would have got off with a much lower rating than they did. In the statement of the Governor, he had accounted for 7d. difference between the two Companies. It said: "The actual difference between the prices of gas of the two Companies for the year 1893 was 7·2d. per 1000 cubic feet. It would therefore appear, from the foregoing figures, that, had the conditions of supply of gas by the Chartered Company been as favourable as those of the South Metropolitan Company, the price of gas would have been the same in both Companies' districts." There was a difference in 1893 of 7d.; but in 1890 there was one of only 3d. How did the conditions between them become so much more unfavourable in three years that the Chartered Company had had to charge 7d. more than the South Metropolitan Company in 1893, when in 1890 they only charged 3d. more? He was sorry to have had to go into all these matters; and he did not believe the controversy would help either of the Companies. With regard to the Nine Elms case, it was not costs but damages. He had said over and over again that they were acting in strict accordance with the law and practice which had prevailed for more than thirty years; and, before the gas was laid on at Nine Elms, he called on Mr. Phillips and told that gentleman what was contemplated. Mr. Phillips said: "I see the difficulty. We shall not like it; but we must grin and bear it." There was at the time an idea that the South Metropolitan Company would cross the river; and Mr. Phillips said: "If you do that, there will be a devil of a row." (Laughter.) He (the speaker) replied that there was no intention on their part to do so. They were acting on the recognized interpretation of the law and practice for thirty years; and the Chartered Company's own Solicitors advised the Company in that way. However, the Company thought it would be a serious matter to lose this customer at Nine Elms; but they refused to give 5 per cent. discount, and this was why they lost him. He (the speaker) said now, as he felt all through, that the right course to have pursued in the matter would have been to have had a friendly action between the two Companies to obtain a proper interpretation of the law. The action, however, was not fought in a friendly way. He might point out that it was won by the South Metropolitan Company in the two lower Courts, but was decided in the Chartered Company's favour in the House of Lords. After it was decided, the Company asked the Secretary of the South Metropolitan Company—an old officer of the Chartered Company—for a statement of the quantity of gas consumed at Nine Elms during the three years. This statement, of course, was furnished. Similar statements were constantly being asked for by the parish and rating authorities as to how much gas had been used in a certain area; and the Company's word was invariably taken. What, however, did the Chartered Company do? They refused to take the South Metropolitan Company's word, and treated them as if they were liars and fools; for they would have been both if they had given a false statement. They sent an officer, Mr. Foulger—who, to his credit, came very reluctantly—to the offices of the South Metropolitan Company to examine their books, and to see whether their Secretary had told the truth. He said this was evidence of a spirit that ought not to have been manifested.

A Shareholder inquired whether Mr. Livesey mentioned this at the time.

Mr. Livesey replied that at the time they were in the power of the Gas Workers' Union, and he was very anxious to be on friendly terms with the Company. For the sake of peace, therefore, he submitted; but he had not forgotten the matter, for it was a direct insult to the South Metropolitan Company to have thought that they would have furnished the Chartered Company with a false statement. Then came the strike. The Chartered Company first brought the Gas Workers' Union into existence at Beckton; and the Companies all had to follow suit and become slaves of it. In connection with the strike, the South Metropolitan rendered a great service to the Chartered Company. He came into that room to attend the meeting in February, 1890; and, to his great surprise and pleasure, the shareholders recognized this, and gave him a reception such as they seldom accorded to anyone. The question arose at that meeting about the damages in the Nine Elms case; and there was a very warm and hearty expression of feeling on the part of the shareholders, one of whom said: "Let us drop it, and I will move a resolution." The Governor remarked: "This is not the time for doing so. Wait until the report is passed, and then the resolution can come on." The Governor also used some very kind words; and, as far as he (the speaker) was concerned, all past feeling was wiped out, and he experienced the utmost gratification at the idea that they were friends again. When the time came, the Governor said to the shareholder—whose name he (the speaker) did not know: "Now is the time for your resolution." Thereupon he (Mr. Livesey) said: "I think no resolution is necessary; and I shall be quite contented if the matter is left in the hands of the Directors." The Governor afterwards spoke to him, and invited him to his house to discuss the

questions. He went there thinking that they were meeting to see how the views of the shareholders could be carried out. The £6000 did not matter to his Company; and he was not going to ask for a remission of damages. His colleagues would have felt very much annoyed if he had come to ask anything as a favour; but he had expected that the Governor would have dealt with the matter on the lines indicated by the shareholders. The Governor said: "Nothing will please me better than to have these damages fixed as low as possible." The Chartered Company had already sent in a claim for damages for more than £7000, and had piled them up by endeavouring to show, in a clever accountant's way, that they were making a far larger profit per 1000 cubic feet at the lower price of gas on the south side of the Thames than their accounts showed they were making on the whole concern. All feeling about that, however, was wiped out. The Governor told him that nothing would please him better than to have the damages fixed as low as possible.

The GOVERNOR remarked that what he said was that the less the damages were, the better pleased he would be.

Mr. LIVESEY said he would accept this statement. After that, however, the Board authorized someone to considerably increase the amount claimed; and he would mention one item as a specimen. They charged compound interest; and instead of being contented with charging compound interest annually, as was always done, they calculated it quarterly. They charged a paltry 19s. for pitch, though what it could have been used for he did not know. The damages were, in fact, piled up in every way; and although he did not like the word "vindictive," he could not use any other. What the Governor ought to have done—and it would have made the two Companies friends—was to have said, at the next general meeting: "In consequence of the hearty expression of the shareholders, and their evident desire that the two Companies should be on friendly terms again, I have to propose a resolution that the claim for damages be not further pressed." He was sure that a unanimous vote would have been given on such a resolution.

The GOVERNOR observed that a unanimous vote in that room in favour of such a resolution would not have stood the law against any recusant shareholder.

Mr. LIVESEY stated that, if the Governor had made the endeavour, he (the speaker) would have been satisfied. If he could now have one word of regret that something was done not quite in accordance with what ought to have been done—he would be ready to hold out his hand.

A SHAREHOLDER: Do you withdraw your statement?

Mr. LIVESEY: I have justified it.

The GOVERNOR, in reply, said he was thankful and grateful to Mr. Livesey for attending the meeting, and stating his grievance. The first remark made by Mr. Livesey was that the Chartered Company in the matter of meter-rents had lost their "tail" in the City. But Mr. Livesey had no tail at all in 1876, for he never charged meter-rents at that time. The Chairman of the House of Commons Committee asked why meter-rents were not charged by him; and Mr. Livesey replied that it was a very obnoxious and objectionable charge, and that they had better not have it.

Mr. LIVESEY admitted that this was quite true; and, under similar circumstances, he would say it again. But this was before the sliding-scale came into operation. The Chartered Company had 3s. 9d. as their initial price; and the South Metropolitan Company thought they had been unfairly treated in being put at 3s. 6d. Directly they got their Act of Parliament, they said: "They have treated us so unfairly that we will take advantage of what the Act gives us. We will put on meter-rents, and this will enable us to reduce our price by 1d., and get an extra ¼ per cent. dividend."

The GOVERNOR said this was quite true; but the fact remained that, sliding-scale or no sliding-scale, meter-rents were, in Mr. Livesey's opinion, objectionable and obnoxious; and the Chartered Company were now prepared to get rid of them, though if the other Companies did not support this it could not be done. He must call the attention of the meeting to the fact that what he complained of in Mr. Livesey's speech in February was, not remarks general to the history of the Company many years ago, but to the statement which he (the Governor) had made, and which Mr. Livesey led the public—unintentionally—to believe was not a true but a bogus statement. If the statement were erroneous, Mr. Livesey should have pointed out where it was wrong. With reference to the question of taxes, Mr. Livesey had said that the Company could have had them settled at 10 per cent.; but their Surveyors informed them that they could not settle more at 10 per cent., and that nothing remained for them to do but to appeal. They did so; and the result was very beneficial, for they saved about £50,000. If Mr. Livesey imagined that there was any intention on the part of the Chartered Company to insult the South Metropolitan Company in connection with putting in the Company's claim in the Nine Elms action, he was entirely mistaken.

Mr. LIVESEY: What about examining our books?

The GOVERNOR said that, whenever a property was bought, the solicitors on both sides went into the matter. But they were not private individuals. If they were, they would take each other's words; but, as trustees for the shareholders' money, they were bound to see that everything was right. However, if Mr. Livesey thought there was any intention to insult his Company, he (Colonel Makins) assured him that this was not the case.

Mr. LIVESEY: Not by you.

The GOVERNOR: Nor by anyone. If there had been, he would have been the first to withdraw, if Mr. Livesey had complained. Then the incapacity charged against the Chartered Company was that, although there was only a difference of 3d. per 1000 between the prices of the two Companies at one time, that difference had since risen to 7d. Happily for Mr. Livesey, there was no electric light in his district to contend against; but there was in the Chartered Company's, and this accounted for the increase in the difference. Mr. Livesey had said there was no reason why there should be any difference in price in the "finest district in the world" and in the "less favourable parts." The Chartered Company's district, however, was not the "finest in the world" for gas purposes. A great many of the consumers only lived in London half the time; but nevertheless they required to have as large a plant available for the daily supply as if they were always in London. Then they had the electric light, which had stopped their increase, though it had not caused them to have a decrease. Mr. Livesey was very properly regarded as a great authority on gas matters, and was rather a pet of the public authorities; and his Company were treated much more leniently with reference to testing than were the Chartered Company.

Mr. LIVESEY dissented.

The GOVERNOR said he would give the figures on which he based his statement, and he would be very glad then to be corrected if he were wrong. The most recent evidence was furnished by a letter under Mr. Bush's signature to the London County Council. That letter contained the following statement: "It has always been understood that the gas should be tested by sample taken from a large main—generally the principal main leading from the works. This has been the practice of the Referees; and all this Company's gas is so tested"—that was, all the South Metropolitan Company's gas. So far, however, from this rule having been applied to the Chartered Company, their Beckton gas was tested on a 3-inch main at a distance of 13 miles from Beckton, on a 6-inch main 10 miles from Beckton, on an 8-inch main 9 miles from Beckton, on a 12-inch main 8 miles from Beckton, and on a 15-inch main 12 miles from Beckton; and in only one case was it tested on a "principal main [the 48-inch] leading from the works." Their Bromley gas was tested on a 9-inch main, and only once on a trunk main; their Shoreditch gas was tested on a 5-inch main; their Nine Elms gas, on a 14-inch and an 18-inch main; their St. Pancras gas, on a 15-inch main; and their Bow Common and Haggerston gas, on an 18-inch main. Thus the treatment meted out to the Chartered Company in the matter of testing was very much more severe than was experienced by the South Metropolitan Company; and he did not think Mr. Livesey could deny this after what he (the Governor) had just stated.

Mr. LIVESEY did not think so; he only knew that the Chartered Company's officers informed them that in nearly all cases the testing was from the leading mains.

The GOVERNOR said he had read a statement of fact furnished by their officers, and signed by Mr. Trewby; and he had no hesitation in putting that forward as a correct and true statement of facts. Then a short time ago Mr. Livesey was allowed to try an illegal experiment in sending out 14-candle gas.

Mr. LIVESEY observed that it was not 14-candle gas.

The GOVERNOR said it was something below the standard. He did not say that it was wrong, but that it was a very lenient proceeding on the part of the public authorities. He did not complain. He only said that, in certain things, leniency was shown to Mr. Livesey, and that the South Metropolitan Company got nearly all the "half pence" while the Chartered Company got the "kicks." (Laughter.) If the County Council used the portable photometer at the testing-stations, he took it that it would be legal; but if they tried to use it anywhere else, it would be an infringement of the Act, which they would resist.

Mr. LIVESEY said the South Metropolitan Company did not consider its use anywhere was legal.

The GOVERNOR (continuing) stated that the Referees had the power of prescribing the apparatus by which the gas should be tested, and the place; but the place must be a proper testing-station, where they could attend. In conclusion, he said: Now, Mr. Livesey, let bygones be bygones. Let us shake hands; and let us combine together to fight the common enemy—whether the Rollits, the Naorojis, or the County Council. (Cheers.)

Mr. ROKEBY PRICE said that, on the occasion to which Mr. Livesey had referred, no one cheered that gentleman more heartily than he did. He believed that Mr. Livesey, by his action, had rendered incalculable service, not only to gas companies, but to every company in this country. No doubt Mr. Livesey was a good fighting man; but he regretted to see him displaying his fighting qualities half year after half year. He was also extremely sorry at the accusation of incapacity which Mr. Livesey had made against those who were managing the Chartered Company; and he hoped Mr. Livesey would now "bury the hatchet."

Mr. LIVESEY said he desired to do so.

Mr. ROKEBY PRICE said he thought Mr. Livesey might accept what the Governor had stated in explanation of the course that was taken by the Company in connection with the Nine Elms lawsuit and the damages arising out of it.

Mr. COPPIN said he had always held that the two Companies, instead of being at loggerheads, ought to work in the most friendly way. He agreed with Mr. Livesey that damages ought not to have been insisted on by the Chartered Company, in spite of the Governor's doctrine.

The GOVERNOR stated that it was not his doctrine, but the doctrine of Counsel.

Mr. COPPIN: The examination by the Company's official of the South Metropolitan Company's books was also a mistake. When figures were put forward, they were always accepted, unless the parties giving them were of shady character. He did not agree, however, with Mr. Livesey in having brought the matter up as he had done at the South Metropolitan Company's meeting. After what had occurred at their meeting that day, he hoped the two Companies would work in harmony.

The GOVERNOR then put the motion, and it was carried.

Resolutions were afterwards passed approving the dividend and authorizing the disposal of certain lands no longer required by the Company for the purposes of their undertaking.

A vote of thanks to the Governor, Directors, and officers of the Company was then passed.

The GOVERNOR, in acknowledging the compliment, said it had not been a pleasant task for him to preside on that occasion; but he was glad that the meeting had ended so happily.

The proceedings then terminated.

Liverpool Water Supply.—At the meeting of the Liverpool City Council last Wednesday, a recommendation of the Water Committee was adopted that a sum of £2000 should be placed at their disposal for the extension and improvement of the Chorley works, in accordance with section 67 of the Liverpool Corporation Act, 1893.

SOUTH METROPOLITAN GAS COMPANY.

The Half-Yearly Report and Accounts.

The following is the report of the Directors of the above Company, which, with the accounts for the six months ending June 30 last (given on page 291), will be presented to the proprietors at the half-yearly general meeting on the 15th inst.:—

The Directors have the satisfaction to report that, after renewing their coal contracts at an appreciable advance on the previous year's prices, they found there was a reasonable probability of sufficient profit to enable them to reduce the price of gas. They therefore announced, on the 10th of May, that from March last another penny would be taken off, equal to £28,000 a year to the consumers; thus bringing the price down to 2s. 4d. per 1000 cubic feet. This action has been justified by the half-year's working shown in the accompanying accounts.

This favourable result has been produced by the low price of coal under last year's contracts, now unfortunately increased; the exceptionally good returns from products, always precarious; a satisfactory increase of business, equal to 5¾ per cent. over the corresponding half of 1893; and the praiseworthy devotion of all the principal officers to the Company's interests, seconded, as it is, by the cheerful spirit in which the subordinate officers and workmen, with few exceptions, do their duty.

There has been a remarkable increase in the number of consumers and of gas-stoves. From June, 1893, to June, 1894, the meters in use have increased from 86,875 to 102,411; and the gas-stoves let on hire, from 21,600 to 29,705. Ordinary consumers and stoves have furnished more than their usual quota; but the great advance is mainly due to the demand for the "penny-in-the-slot" meters and small cooking-stoves by working people—now amounting to an average of about 300 new customers of this class weekly. The total number of these customers obtained in less than two years up to date (Aug. 4) is over 19,000, consuming on an average 12,000 cubic feet a year, and considerably more where a small cooking-stove is supplied.

The manufacturing works and plant are now well in advance of the demand. But the increase of capital expenditure still goes on—chiefly at present in providing additional mains, services, meters, and stoves for the new consumers; and machinery is being gradually adopted in the retort-houses.

Four years' experience of the profit-sharing system, as applied to the Company's officers and workmen, has justified the Directors increasing the percentage of annual bonus, on condition that one-half of the total bonus shall be invested in the Company's ordinary stock; thus making the employees shareholders. The system, adopted in November, 1889, and still in force, is simply an extension of the principle of the sliding-scale to the officers and workmen, who now receive a bonus of 1½ per cent. upon their salaries and wages for every penny at which gas is sold below 2s. 8d. per 1000 cubic feet, subject to the above-named condition. The total amount paid in the five years is £51,778, of which rather more than half has been withdrawn. Of the remainder, increased considerably by the workmen's savings, £26,530 is now deposited with the Company at 4 per cent. interest; £12,867 has been invested by 331 workmen in the Company's stock; and £3720 has, in accordance with the new rule, been also invested in stock in the names of trustees on behalf of 1645 workmen—thus giving all these men a new interest as shareholders in the Company's prosperity.

The policy adopted during the last few years, of giving facilities to the consumers and workmen to make investments in the Company's stock, bearing a nominally high dividend, has brought into marked prominence the objections and difficulties attending the issue of a nominal 13 per cent. stock at such a high premium that the investor gets only about 5 per cent. on his investment. Investors, especially of small amounts, have a great objection to giving (say) £13 for £5 of stock; and they will not give so high a relative price as they would for a stock if the nominal dividends were lower, and nearly corresponded with that actually paid. This points to the desirability of converting the nominal 10 per cent. stocks of the Company into equivalent amounts of 5 per cent.—a plan that has been largely adopted by railway companies, and lately by the Bristol, Oxford, Crystal Palace District, and Plymouth Gas Companies.

The price of gas entitles the shareholders to a dividend of 13½ per cent.; but bearing in mind that the reserve fund has been so seriously diminished within the last five years, the Directors consider it necessary that it should be materially strengthened. They do not recommend any increase of dividend, but that the same rate as before be paid—viz., 13 per cent. (to a considerable extent nominal), apportioned in accordance with the Scheme of Amalgamation, excepting a fraction due to the "A" stock (undivided as usual). This will be carried, with the odd ½ per cent. of dividend unpaid, to the reserve fund, which will then amount to £60,294. They have also added £10,679 to the insurance fund, which now stands at £30,915. There will then remain an undivided balance, including £15,243 17s. 8d. brought forward, of £27,954 7s. 7d. to carry forward to the next half year.

Following the report are the usual statements of accounts. As on previous occasions, we merely note the changes in those portions subject to but slight alteration; giving the remainder in full.

Statements Nos. 1 and 2 show the amount of share and loan capital raised at the close of the past half year. The former stood at £2,135,875; the latter at £775,000—increases of £25,875 and £25,000 respectively as compared with Dec. 30 last.

Statements Nos. 3, 4, and 5—the capital, revenue, and profit and loss accounts—are given in full on p. 291.

Statements Nos. 6, 7, and 8 show the positions of the reserve, renewal, and insurance funds. The reserve fund stood at £54,455, as compared with £50,037 on Dec. 31, 1893; the renewal fund, at £12,886, as compared with £12,587; and the insurance fund, at £30,915, compared with £20,060.

Statements Nos. 9 to 11—furnishing particulars as to the manufacturing operations of the Company—and No. 12, the general balance-sheet, are given in full.

BRENTFORD GAS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held on Friday last, at the Charing Cross Hotel, under the presidency of Mr. HOWARD CHARLES WARD.

The SECRETARY (Mr. William Croxford) read the notice convening the meeting, and the minutes of the meeting held on Feb. 16 last.

The CHAIRMAN said he thought all the shareholders who had perused the report and accounts would agree with the Directors that there was every reason to be satisfied with them. The report (see *ante*, p. 242) was of an unusually favourable character. From the first paragraph of it, they would see that the amount of undivided profit to be dealt with was £60,117—an increase since last half year of about £8000 (putting it in round figures). And here he desired to impress upon them the fact that the amount of undivided profit remaining after the proposed dividends had been paid would only be practically the same as it was ten years ago—something like £29,000. During the whole of the intervening time, they had not placed (as they could have done) anything to an insurance fund; because, if they had done so, they would have been obliged to tax the consumers for the amount. They would have been quite within their legal rights to have taken such a step; and the sum they could have so appropriated would by this time have reached the total of £41,780. In these days of agitation and complaints about the price of gas, he thought it was only fair to bring forward and emphasize the fact that, during the whole of the past ten years, they had not taken one penny from the consumers beyond what was required to enable the Company to pay their statutory dividends. The extra sum they might have exacted from the consumers, to build up an insurance fund (put in another way), was 1 per cent. per annum, or one-twentieth part of their total capital. As certain individuals were endeavouring to make out that the aim of gas companies was merely to get the utmost price they could for their own benefit, he felt it was highly important that this fact should be as widely known as possible. Ten years ago, too, the price of gas in their district was 3s. 9d. and 3s. 6d. per 1000 cubic feet; whereas now it was 3s. 1d. The third paragraph in the report informed the proprietors that the first use they had made of the surplus consequent upon the good half year they had had, had been to give notice to their consumers of a reduction of 2d. per 1000 cubic feet in the price of gas, as from the taking of the meter-indices for the Midsummer quarter. The first quarter of the half year now under review was very fine, so far as weather was concerned; and therefore there was but little increase in the business of any gas company. The second quarter, however, was wet and cold; and so the consumption of gas was larger. The result was that, for the past half year, the increased gas consumption was 5·8 per cent. About this time twelve months ago, they introduced the use of prepayment or automatic meters—more familiarly known as "penny-in-the-slot" meters. Last year they had only 77 meters of this kind out; but on June 30 of this year, that number had grown to 1567, and during the month of July they had fixed another 150 of them. He was at Brentford the previous day with his co-Directors, and there, in their meter-store, he saw an immense number of these automatic meters ticketed and ready to go out, which showed that they were being largely appreciated. The important thing about this kind of business was that they were tapping an entirely new source of revenue. The meters were supplied to a class of consumers who previously burned oil or candles; but these people had begun to find out how very convenient the meters were. Working people had also begun to use gas for stoves, with which to cook their breakfast; because it saved them all the trouble of lighting a fire. In the last paragraph of the report, the Directors referred to their intention of raising £30,000 of fresh capital. Their capital account showed that, during the past six months, they had expended on capital account £6751, of which only £935 had been spent on new buildings and machinery. The whole of the remainder, amounting to nearly £6000, had been expended in the purchase of meters and stoves, and in connection with the laying of additional mains and services. The capital account had been overspent by some £2167; and for this reason, as well as to provide the Directors with money to carry on the business, they had decided to raise the amount he had mentioned. Turning to the balance-sheet, it would be seen that, for the quarter ending June 30 last, the amount due to the Company for gas and meter rental was £33,811, which, with the arrears outstanding (£2949), came to £36,761. The stores, including coals, £14,530, gave a total of £21,343. Together, the stores and the gas and meter rental amounted to £58,000; and this money they had to find in advance—they had done it virtually without borrowing from their bankers. Of course, they were obliged to obtain a small advance now and again; but where the money really came from was their undivided balance of profit, which was utilized for the time being. The Board thought they made a much better use of it in this way than they would do by putting it on one side, and "ear-marking" it as undivided profit. Employed as it was, it was helping to earn the shareholders their dividend, and it relieved them from the necessity of paying from 9 to 12 per cent. upon new capital to take its place. The Board had no need to submit any resolution with reference to the raising of the proposed new capital, as the power to do so had already been conferred upon them. It was felt to be only right, however, that, as they were assembled in general meeting, he should tell them what the Directors had decided to do. The notices with reference to the new stock could be sent out dated Aug. 10; and, of course, the minimum price would be stated. They were obliged to offer the stock for tender; and those who were prepared to open their purses and pay the largest sum would obtain the stock. In the revenue account, almost everything was satisfactory. As he had before stated, the sale of gas showed an increase of more than 5 per cent. They had purchased their coals at a considerable reduction; and, although they had used a good many more tons in the half year, the cost of the coals had been nearly £2000 less. The sale of residual products had been very satisfactory. They had received £17,321 for their coke; £100 for their breeze; £3284 for their tar; and £5846 for their ammoniacal liquor—a total of £26,500, against £19,600 for the corresponding half year. The total result of the half-year's working showed a profit of

£42,293, as compared with £31,218 for the half year ending Midsummer, 1893. This, in itself, was satisfactory; and he thought the shareholders had every reason to be satisfied with it. He moved—"That the report and accounts be received and adopted, and entered on the minutes."

Mr. J. ORWELL PHILLIPS seconded the motion.

Mr. F. C. CLARKE inquired if their penny-in-the-slot meters were more successful than were those of The Gaslight and Coke Company. He had just come from that Company's meeting, where it was said they were not a success.

The CHAIRMAN replied that they had not been started by The Gaslight and Coke Company yet, as there had been some hesitation in the matter. The Brentford Gas Company, however, found the automatic meters a great success; and he had no doubt The Gaslight and Coke Company would also.

Mr. W. HUGHES asked how the business in the gas-stoves was going on.

The CHAIRMAN said that gas-stoves were making headway at a great pace. Those who had the penny-in-the-slot meters paid 6d. extra a quarter for their stoves.

Mr. DENNY asked if it were proposed to commence an insurance fund such as the Chairman had alluded to.

The CHAIRMAN thought not. The Board desired to deal with their consumers as tenderly as they could, although their consumers might deal with them in a contrary spirit.

The motion for the adoption of the report was then agreed to.

The CHAIRMAN next moved—"That dividends for the half year ending June 30, 1894, subject to income-tax, be declared, namely, at the rate of 5 per cent. per annum on the 5 per cent. preference stock, at the rate of 11½ per cent. per annum on the consolidated stock, and at the rate of 8½ per cent. per annum on the new stock, 1881; and that such dividends be payable on the 1st of September next."

Mr. J. O. PHILLIPS seconded the motion, and it was carried.

Mr. F. C. CLARKE moved a vote of thanks to the Chairman and Directors for their able management of the affairs of the Company; also to the Auditors, and the Engineer, Secretary, and officers.

Mr. A. SKAIFE seconded the proposition, which was carried.

The CHAIRMAN having briefly acknowledged the compliment, the proceedings terminated.

PROVINCIAL GAS AND WATER COMPANIES.

Following our custom of late years, we shall publish, in the next few issues of the JOURNAL, the most noteworthy points of the reports and accounts which we receive from Provincial Gas and Water Companies.

Gas Companies.

The report of the Directors of the Calverley and Horsforth District Gas Company states that the total income for the past six months amounted to £4000. This included £3018 received for gas and meter rents, and £935 from the sale of residual products. The expenditure amounted to £2555, which included £2038 for coals, wages, repairs, and maintenance of plant, purifying materials, &c. The balance of £1445 is carried to the credit of the profit and loss account. During the half year, the Directors exercised their borrowing powers to the extent of £2000; leaving £1500 remaining to be raised on loan.

The ordinary half-yearly general meeting of the Cambridge University and Town Gas Company was held on the 26th ult.—Mr. D. Adams in the chair. The Directors recommended dividends at the rates of 10 and 7 per cent. per annum, after the payment of which there would be a balance of £497, which it was proposed to add to the reserve fund. They stated that the satisfactory result of the half-year's working was mainly due to the very careful and able management of Mr. O. J. Weeks; and it was a source of great congratulation to the shareholders that the Board were able to secure his valuable services as Manager. Mr. Weeks, in his report to the Directors, stated that the whole of the works were in good repair. The increase in the consumption of gas had been equal to the average of former periods; while the illuminating power, pressure, and purity had been maintained. The Chairman, in moving the adoption of the report, remarked that the Company had had to struggle through a great calamity, like undertakings in most parts of the country, in consequence of the coal strike; but through the foresight exercised in providing for contingencies, the Company had got over it very well. He must say at once that they had to be thankful to Mr. Weeks for his excellent management of their works, and for their present prosperous position. Instead of going to their reserve fund to take something from it, they would have the pleasurable opportunity of adding to it £497, after paying the full dividends. They showed an increase of £1017 on the half year in profits. He did not think he could say anything more congratulatory than this. The report was adopted, and the dividends recommended were declared.

The 52nd half-yearly meeting of the Chester United Gas Company was held last Thursday, when the Directors reported that, notwithstanding some additional charges which had had to be met since last half year, in consequence of the coal strike, they were able to recommend the payment of the usual statutory dividends on the ordinary stocks. The amount available for this purpose, as shown by the accounts, was £3884. The total revenue was £16,161; the expenditure, £10,628—leaving a balance of £5533. Reference was made to the completion of the additional gasholder, on the Gadd and Mason principle, commenced about a year ago, which was stated to be working satisfactorily. The Chairman (Mr. J. Gamon), in moving the adoption of the report, said it was not without a certain amount of diffidence that he stood before the proprietors as the successor to Mr. Bagnall, who had resigned the chairmanship of the Company, after holding it for 28 years, on account of failing health. He (Mr. Gamon) was, however, encouraged to take the post by the confidence of his brother Directors, and his experience of the valuable assistance rendered by their excellent Secretary (Mr. J. Pye) and Engineer (Mr. R. Hunter). The reduction in price of 2d. per 1000 cubic feet from July, 1893, was made without any knowledge of the disaster which was to follow upon all similar undertakings in consequence of the coal strike, which cost the Company £3100 in the extra price they had to pay for their coal. Other companies at once raised the price of gas; but, relying on the indulgence of the shareholders to allow them to use some of the reserve fund, they thought they would not "hark back," but carry out their intention, although it had involved the loss he had mentioned. The accounts were of an ordinary character; the only item calling for notice being that of residual products, which realized £500 more for the half year, and also an increase in their coal contracts of 5d. per ton. After referring to the public lighting of the city, and to the establishment of new gas-works, he moved the declaration of the dividends recommended; and the motion was carried.

The balance-sheet of the Kildwick Gas Company for the year ended June 30 last, shows that the total profits, including £420 brought forward and deducting £200 for depreciations, amount to £2026. Out of this sum, an interim dividend of 2½ per cent. has been paid; leaving £1298 to be disposed of. The Directors recommend a further dividend of 2½ per cent., less income-tax, that £250 be carried to the reserve fund, and that the balance of £321 be carried forward. The Directors propose asking the shareholders' permission to take the necessary steps for obtaining powers to increase the capital.

The statement of accounts to be submitted to the proprietors of the Scarborough Gas Company at their half-yearly meeting next Saturday, shows an amount of £5844 (including £1242 brought forward) available for division; and out of this sum, after providing for the dividend on the preference stock, the Directors recommend the payment of maximum dividends upon all the other stocks of the Company, less income-tax. This will absorb £5246, and leave a balance of £598 to be carried forward. The receipts for gas for public and private lighting amounted in the past six months to £13,176; those from the sale of residuals, to £3093—the total revenue being £16,956. The expenditure (including £6807 for coals) amounted to £11,899—leaving £5057 to go to the profit and loss account. With regard to the works, which are under the supervision of Mr. J. Holliday, Assoc.M.Inst.C.E., F.C.S., the surplus balance will be required to meet the cost of rebuilding the remainder of the retort-stack in No. 1 retort-house; and the Directors are considering the advisability of introducing a system of regenerative heating in connection with the renewal. There has been a satisfactory increase in the demand for gas; and, as a consequence, it has been found necessary to re-arrange the distributing plant. For the same reason, the storeage plant is also to be extended. To meet the expenditure on capital account to be incurred by these changes, it has been decided to call up the amount remaining on the new shares; and as the Company's authorized capital will then be exhausted, it is proposed to apply to Parliament next session for power to raise more money for the general purposes of the undertaking.

The business of the Tamworth Gas Company is in a most satisfactory condition all round. The consumption of gas continues to increase, it having, during the past half year, risen to the extent of 8·7 per cent., which, in the Directors' opinion, is owing to the use of gas cookers and fires, the trade in which is extending. The usual half-yearly dividends of 10 and 7 per cent. have been declared.

At the annual general meeting of the Taunton Gas Company last Tuesday, the Directors reported that, notwithstanding the protracted difficulties in the coal trade, they were able to announce that the profits were sufficient to pay the statutory dividends—viz., 8 and 7 per cent. on the consolidated and new stock. The quantity of gas sent out in the twelve months ending June 30 last was 59,199,600 cubic feet, and the accounts showed receipts for gas supplied for public and private lighting to the amount of £11,320. There was a balance of £4059 at the close of the year.

The half-yearly general meeting of the York United Gas Company was held last Thursday—Mr. J. F. Taylor in the chair. The Directors, in their report, recommended a dividend of 5s. per share, being at the rate of 5 per cent. per annum, and stated that the general business of the Company continued to make steady progress, the consumption of gas for the half year showing an increase of 3 per cent. The Chairman, in moving the adoption of the report, referred to the fact that this was their jubilee year. The Company was started in 1844, when the price for gas was 6s. 8d. per 1000 cubic feet; while this year it was 1s. 11d. to 2s. 2d. It was a disputed point, he said, whether York or Birmingham was the first town in the kingdom to supply gas as low as 2s. 6d. In 1844 the make of gas was 26 million cubic feet; while in the year ending June last it was 390 millions. He referred to the extensions that were being made, which would give a better supply of gas to the district on the south side of the city. The motion was carried unanimously. A resolution was then passed declaring a dividend of 5s. per share. The Directors were all re-elected; and a vote of thanks to the Chairman concluded the meeting.

Water Companies.

During the past half year the capital expenditure of the Colne Valley Water Company has amounted to £5225, of which rather more than £3000 was paid on account of the new well and headings. These works were brought to a satisfactory completion early in June; and, according to the Directors' report, the result has fully justified their expectations. The net profit of the six months was £4263; and including the balance of £329 brought forward, and a small sum for interest on deposits, there is a surplus of £2806 available for dividend, after paying the interest on debenture stock and preference shares, and transferring £250 to the old engines suspense account, and £100 to reserve account. Out of this balance, it is proposed to pay a dividend at the rate of 3¾ per cent. per annum, less income-tax; leaving £334 to carry forward. The Directors intimate, with reference to the Colne Valley and Central Middlesex Water Bill, that they are proposing to take over the new district at Michaelmas, and that, in order to raise the additional purchase money, a further issue of new shares will have to be made.

The accounts presented at the half-yearly meeting of the York New Water-Works Company last Thursday, showed that the rental from the sale of water amounted to £8713. The result of the half-year's working was a balance of £6965, out of which the Directors recommended the payment of dividends of 5, 9, and 6¼ per cent. per annum on the preference, ordinary, and new shares.

ACCOUNTS OF THE SOUTH METROPOLITAN GAS COMPANY FOR THE HALF YEAR ENDED JUNE 30, 1894.

No. 3.—CAPITAL ACCOUNT.

Dr.

	£ s. d.	£ s. d.
To Expenditure to Dec. 31, 1893	..	3,174,283 12 5
Expenditure during half year to June 30, 1894, viz.—		
New buildings and machinery in extension of works	1,579 10 9	
New and additional mains and services	6,063 0 0	
Do. meters	13,465 10 3	
Do. stoves	12,812 6 10	
	33,921 7 10	
Cr.—By sale of land	4,350 0 0	
		29,571 7 10
Total expenditure	..	3,203,855 0 3
Balance	..	175,525 4 9
		3,379,380 5 0

Cr.

Description of Capital.	Certified to Dec. 31, 1893.	Received since that Date.	Total to June 30, 1894.
	£ s. d.	£ s. d.	£ s. d.
By A stock	500,000 0 0	..	500,000 0 0
B stock	1,350,000 0 0	..	1,350,000 0 0
C stock	260,000 0 0	25,875 0 0	285,875 0 0
Debenture stock, 5 per cent.	750,000 0 0	25,000 0 0	775,000 0 0
	2,860,000 0 0	50,875 0 0	2,910,875 0 0
Premium capital	416,417 0 0	52,088 5 0	468,505 5 0
	3,276,417 0 0	102,963 5 0	
			3,379,380 5 0

No. 4.—REVENUE ACCOUNT.

To Manufacture of gas—			
Coals into store, including cost of petroleum spirit for enriching. (See Account No. 9)	£189,424 9 0		
Purification, including £4647 1s. 9d. for labour.	8,043 11 1		
Salaries of Engineer and Officers at works	5,647 6 5		
Wages (carbonizing)	47,362 11 7		
Repairs and maintenance of works and plant, including £29,952 19s. 10d. for labour, less £1177 5s. 11d. received for old materials	66,793 6 5		
		£317,354 4 6	
Profit sharing for year ending June 30, 1894	£12,435 10 9		
Less on account, Dec. 31, 1893	6,000 0 0		
		6,435 10 9	
Distribution of gas—			
Repair, maintenance, and renewal of mains and service pipes, including £8472 14s. 7d. for labour	£12,608 8 10		
Salaries, &c., Officers and Rental Clerks	10,309 0 6		
Repair, &c., of meters (£912 3s. 0d. for labour)	7,496 0 0		
Repair, &c., of stoves, (£1919 16s. 2d. labour).	7,605 6 3		
		38,018 15 7	
Public lamps—lighting and repairing		6,449 1 10	
Rents, rates, and taxes		23,242 10 3	
Management—			
Directors' allowance	£1,750 0 0		
Salaries of Secretary, Accountant, and Clerks	2,078 18 1		
Collectors	5,890 5 6		
Stationery and printing	1,519 2 10		
General charges	3,756 11 2		
Company's Auditors	112 10 0		
		15,107 7 7	
Law charges		3,709 8 9	
Bad debts		1,756 11 4	
Pensions and officers and men's superannuation and sick funds		4,185 19 3	
Gas Referees and Official Auditor		298 19 2	
Expenses Board of Trade Inquiry (Photometric Standards.) (Previously paid on this account, £988 5s. 10d.)		335 2 2	
Total expenditure		£416,784 11 2	
Balance carried to net revenue account (No. 5)		186,920 6 10	
		£603,704 18 0	

By Sale of gas—			
Lady Day, at 2s. 5d. per 1000 feet	£244,552 6 0		
Midsummer, at 2s. 4d. per 1000 feet	140,219 5 8		
	£384,771 11 8		
Public lighting and under contracts (see Statement No. 11)	30,134 3 1		
		£414,905 14 9	
Meters in use, 102,411—			
Company's meters at rent (87,676)		£9,685 6 4	
Stoves at rent (29,705)		5,607 4 4	
		15,292 10 8	
Residual products—			
Coke, less £12,354 15s. 9d. for labour, &c.	£111,295 16 7		
Breeze, less £1890 7s. 11d. for labour, &c.	3,211 9 6		
Tar, less £315 7s. 5d. for labour, &c.	19,479 16 7		
Ammoniacal liquor, less £197 14s. 9d. for labour, &c.	21,555 4 3		
Sulphate, less £3681 18s. 1d. acid, labour, &c.	16,069 12 0		
		171,611 18 11	
Rents receivable		1,825 18 8	
Transfer fees		68 15 0	
Total receipts		£603,704 18 0	

No. 5.—PROFIT AND LOSS (NET REVENUE) ACCOUNT.

Interest on temporary loan and deposits		£1,063 17 5	
Amount carried to insurance fund		10,679 0 0	
Interest on debenture stock		18,769 11 3	
Balance applicable to dividend on the ordinary stock		172,078 19 7	
		£202,591 8 3	
Balance from last account			£155,031 7 8
Less—Dividend for half year ended Dec. 31, 1893	£136,650 0 0		
Fraction of dividend payable carried to reserve fund	3,137 10 0		
		139,787 10 0	
			£15,243 17 8
Amount from revenue account (No. 4)			186,920 6 10
Interest on Bankers' balances			427 3 9
			£202,591 8 3

No. 9.—STATEMENT OF COALS.

Description of Coal.	In Store, Dec. 31, 1893.	Received during the Half Year.	Carbonized during the Half Year.	Used during the Half Year.	In Store, June 30, 1894.
	Tons.	Tons.	Tons.	Tons.	Tons.
Newcastle coal	59,373	339,493	360,919	410	37,507
Cannel coal	1,847	..	290*	..	1,557
	61,220	339,493	361,209	410	39,064

* 161,101 gallons of petroleum spirit used as a substitute for cannel.

No. 10.—STATEMENT OF RESIDUAL PRODUCTS.

—	In Store, Dec. 31, 1893.	Made during Half Year.	Used in the Half Year.	Sold in the Half Year.	In Store, June 30, 1894.
Coke—cwt.†	126,182	4,457,545	894,778	3,586,487	152,462
Breeze—yards	2,289	68,930	10,978	59,239	1,002
Tar—gallons	381,294	3,539,997	5,407	3,706,580	209,304
Ammoniacal liquor—butts.	13,417	115,602	46,160	73,076	9,783

† 1 cwt. of coke about equals 1 sack of 4 bushels, under Weights and Measures Act, 1878.

No. 11.—STATEMENT OF GAS MADE, SOLD, ETC.

Description of Gas.	Quantity made.	Quantity Sold.			Quantity used on Works, &c.	Total Quantity accounted for.	Quantity not accounted for.	Number of Public Lamps.
		Public Lights (estimated).	Private Lights (per Meter).	Total Quantity Sold.				
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	
Common	3,692,687	214,088	3,258,912	3,473,000	48,197	3,521,197	171,490	19,314

No. 12.—BALANCE-SHEET.

To Capital—			
Balance—per account No. 3		£175,525 4 9	
Reserve fund—per account No. 6		54,455 9 4	
Renewal fund—per account No. 7		12,886 19 10	
Insurance fund—per account No. 8		30,915 17 11	
Net revenue account—for balance, per account No. 5		172,078 19 7	
Debenture interest, for amount due to June 30, 1894		18,769 11 3	
Sundry tradesmen, for amount due for coals, stores, and sundries		56,318 4 3	
Deposits by consumers		32,424 18 5	
Dividend account (outstanding)		1,175 6 7	
Debenture account "		59 14 6	
Workmen's bonus and savings deposited with the Company		38,317 3 10	
		£592,927 10 3	

By Cash at Bankers			£179,867 3 9
Amount invested (reserve fund, £43,547 10s. 3d.; renewal fund, £12,573 12s. 9d.; insurance fund, £12,715 6s. 3d.)			68,836 9 3
Cash in hand for sundry payments			1,000 0 0
Stores in hand—			
Coals and enriching materials	£22,349 15 11		
Coke and breeze	4,179 5 6		
Tar, sulphate, and ammoniacal liquor	4,689 0 4		
Sundry stores	93,602 0 5		
		124,820 2 2	
Investment of workmen's bonus, &c.		6,509 19 6	
Accounts due to the Company—			
Gas, meter, and stove rental, quarter ending Midsummer, 1894	£162,929 4 2		
Arrears outstanding	3,003 8 10	165,932 13 0	
Coke and other residual products		27,614 7 2	
Sundries		18,346 15 5	
		£592,927 10 3	

EDINBURGH AND LEITH GAS COMMISSION.

Adoption of the Peebles Process—The Annual Accounts.

At the Meeting of the Edinburgh and Leith Gas Commission on Monday last week—Mr. KINLOCH ANDERSON in the chair—the Works Committee recommended the erection in the Edinburgh works of plant for the working of the Peebles oil-gas process. This recommendation was made on the advice of a Sub-Committee who held their final meeting on the 9th ult., and in whose report it was stated that they had no hesitation in recommending the adoption of the reports of Mr. Mitchell and Mr. Linton, submitted more than a year ago. They had had plans prepared by Mr. Young for a set of seven double ovens, which they thought might at once be erected as an experiment. If successful, these ovens could easily be made part of a larger series. As to the expense of the experiment, they had obtained reports by Mr. Young and Mr. Mitchell, and would add that there was not included in this calculation of expense the royalty asked by the Oil-Gas Enrichment Company, Limited—viz., 2s. 6d. per ton of oil or tar used for the production of gas by the Peebles process—and which could be commuted for a payment of £7000. They advised that the royalty should not be commuted. They also pointed out that, if required, the experimental set of ovens could, with very little expense, be made suitable for producing ordinary coal gas. Along with this recommendation, there were submitted several documents which had been before the Sub-Committee. The first was the report of Mr. Mitchell to the Commissioners, dated March 17, 1893, a summary of which was given in the "Notes from Scotland" in the JOURNAL for May 2, 1893 (p. 795). The second was the report of Mr. Linton, which was given in the issue for the previous week (p. 738). Then was given a statement, in tabular form, prepared at the Leith works, in which it was shown that the cost of 90-candle power oil gas was 33·62d. per 1000 cubic feet; of 15-candle power coal gas, 13·86d.; and of 25-candle power coal gas, 36·38d.; and that a mixture of 25-candle gas would require about one-seventh of 90-candle oil gas and six-sevenths of 15-candle coal gas, and would cost 32·88d. per 1000 cubic feet. The report by Messrs. Young and Mitchell, dated July 29, 1893, was also given, in which it was recommended that the seven double ovens to be erected, should contain 28 fire-clay retorts, which could be used for either coal or tar, and 21 iron retorts for oil distillation—the clay and iron retorts placed back to back. They stated that they had prepared plans on this scale, showing the connecting mains, exhauster, meter, and condensers, which, including the conversion of the whole 23 ovens of an old retort-bench into clay and iron retorts, they estimated would cost £3083. The installation of seven ovens of combined clay and iron retorts, with the relative plant, they estimated would cost £2203. There was also given a letter by Mr. J. Gordon Mason, S.S.C., the Secretary of the Oil-Gas Enrichment Company, dated March 9, 1894, to the Clerk to the Commissioners, with regard to the terms upon which a licence to work the process would be granted to them, and in which it was pointed out that the adoption of the Peebles process in the Edinburgh and Leith works would lead to a reduction in cost which would be equal to an annual saving of £7500. The last document given was a report by the Sub-Committee, dated May 31, 1894, of their visit to the Perth Gas-Works.

The CHAIRMAN moved the adoption of the report and recommendation. He said it would be remembered that, a few years ago, on the motion of one of the Commissioners, an experiment was tried, under his supervision, at the Leith works which proved a signal failure. On the motion of another Commissioner, they had made experiments in the utilizing of peat for gas making; but the process was so clumsy in its operation that they had no difficulty in disposing of that as well. Later on they concentrated their attention on the enrichment of coal gas by several oil processes. They had the Peebles process; they had the Alexander-Paterson process; and a Mr. Laing had asked them to wait some time till they would be able to judge of his process.* They deferred to Mr. Laing, and delayed a long time, hoping that they might see his process in operation; but their patience was exhausted, and they set it aside, as evidently he himself had difficulty in bringing it to the light of day. The Alexander-Paterson process was reported upon by their Engineers; and it was not generally approved. They had very elaborate reports by their Engineers on the Peebles process; and they both commended it very highly. These reports were submitted as far back as March or April, 1893. They had delayed till they could get some practical results from the process. A Sub-Committee first visited Peebles, at which place were the works practically of the patentee; and they were very well pleased with everything they saw there. They, however, went farther afield. They found that they were hearing really the patentee's own statement; and, while they did not doubt him in the least, they wanted to satisfy themselves. They went to Galashiels; and the statement made by Mr. Young and the reports by their Engineers were supported in almost every figure by the experience of the Manager there. Later they went to Perth, where the works were larger than either of the two they had previously visited; and they had a report by their Engineers on this visit, a portion of which he might read to them:

> The oil-gas plant (which cost £1068) was erected last summer, and was put in operation in November last. It consisted of nine retorts, with the other necessary apparatus, the latter being made of sufficient capacity to deal with the enrichment by oil of all the gas made. The difficulties met with in working the process were stated to be such as might be expected with any apparatus new to the workmen, and were easily overcome. The results had been so satisfactory, that it had been determined to erect this season thirteen retorts for oil and eight retorts for tar, which would be sufficient to provide all the enrichment required; the only coal to be used being cheap splint coal. The proportion of oil gas had been six to one; and this had given them gas of about 27-candle power. The price of the oil was £2 16s. per ton; and the gas made per ton, 22,825 cubic feet, or 86·73 feet per gallon of oil. This is practically identical with the results in the experiments made at Peebles last year, and given in the reports of the Engineers to the Commissioners in April, 1893. It was stated that the partial adoption of the process last year had effected a saving (as compared with what it would have cost to provide the same enrichment of the gas with cannel and shale) which had enabled the Gas Committee to pay the cost of the oil-gas plant, and to contribute a special sum of £700 to a works depreciation fund. It was also estimated that the saving for the current year (the whole enrichment being done by oil and tar) would be from 4d. to 5d. per 1000 cubic feet of gas made. There are local circumstances, such as the cost of getting rid of refuse, and the limited area of the works, which make the process specially suitable in Perth. But this also applies to the Edinburgh works; and the latter have the advantage that splint coal can be brought there at a considerably lower price than in Perth. The price of the coke from the oil would also probably be better in Edinburgh than in Perth, owing to the much larger carriage from there than from Edinburgh to the steel-works, which, the Sub-Committee were informed, were buying all they could of the oil coke, and paying 15s. per ton for it in Perth. The saving to be effected in the Edinburgh works by the adoption of the oil-gas enrichment process should therefore be at least as much per 1000 feet of gas made as that effected in Perth, and would probably be more.

In addition, they had a report by the Manager of the St. Helens Gas-Works—the largest works where the process was in operation—and it corroborated every figure. This showed how accurate and painstaking their Engineers were in going into the subject. Besides this, there were altogether some thirty works which now had the process in operation; and in every case it was very highly spoken of. There were many advantages for them in adopting the process. It should produce a gas very much cheaper than by enrichment with cannel coal. The saving would be something like 3½d. per 1000 cubic feet; and this would mean a good deal on their large consumption. The present proposal was not that they should adopt the process wholly for Edinburgh. They wished in the meantime to make an experiment which would enable them to enrich about one-fifth of their whole requirements; and then they would be able to judge for themselves whether or not it would be a good thing to go farther. The next advantage would be that they had before them the re-construction of the Leith works; and he thought it was well that they should make this practical experiment themselves before they concluded as to what operations were to be conducted at Leith. There would be a great advantage, further, in this respect—that they could do away altogether with shale, and only use common splint coal with the oil. They had a great and an increasing difficulty in getting rid of the refuse from the shale, which was costing them nearly 2s. per ton. Considering the introduction of electricity into the city, it was of the utmost importance that they should do what they could to reduce the price of gas, so that they could make it an agent in other directions, if necessary, though he did not expect that gas for lighting alone would ever be set aside. But the cheaper the gas, the more it would be used for cooking and heating purposes. They had evidence of this in the fact that, while they had been able to reduce the price of gas during the past two years, the consumption had gone up. Referring to the electric light, and in view of a minute which was before them, in which it was stated that the incandescent gas-burner would be of immense value to them, he said it was their duty, as Gas Commissioners, to mind their own interests, and leave others in charge of the electric light. He had a report, drawn up by Mr. Linton, upon the incandescent gas-burner, in which it was stated that one burner consumed 3·44 cubic feet of gas per hour, and the photometric value of the light was 63·44 candles; that the Corporation of Edinburgh proposed to sell electricity at 6d. per unit, which would make seven units equal in price to 1000 cubic feet of gas at 3s. 6d.; and that therefore the illuminating value to be obtained for 3s. 6d. would be: By an incandescent electric lamp, 1540 candles; by an ordinary jet, consuming 5 cubic feet of gas per hour, 5000 candles; and by an incandescent gas-burner, 18,440 candles. He thought this was very reassuring, as it showed that the gas interest would not go to the wall at once. He was anxious to bring this before them, and through them before the public, so as to let them know that they need not be distressed although their next-door neighbour took the electric light, because they could get a suitable light of the same sort at a cheaper rate.

Mr. J. ROBERTSON remarked that he knew a jeweller's shop in Princes Street where incandescent gas-lamps were being used; and he thought the light was preferable to the electric light. He would not himself think of taking the electric light.

Mr. J. JAMIESON seconded the motion; saying he thought they should adopt the process at once. If he could say one word against the Committee's finding, it would be that they might have made a bigger recommendation.

Mr. HUNTER asked the Engineers to give their attention to the cracking of the iron retorts, and to the question of whether a copper or a steel retort could not be adopted.

Mr. LINTON said Mr. Young had just brought out a new process which would obviate what Mr. Hunter was referring to; and they were likely to adopt it.

The CHAIRMAN explained, as to the royalty, that it amounted to about one-fifth of a penny per 1000 cubic feet on the finished gas.

The recommendation was adopted; and the Committee were authorized to proceed with the installation.

The Auditor's report on the annual accounts, certifying them to be correct, was submitted. The Finance Committee recommended that £17,143, being double the minimum amount sanctioned by their Act, should be set apart for the sinking funds; that £3248 should be debited to revenue, expended on the refuse siding and locomotive at Tranent, and on workshops; and that the balance of £37,489 should be carried forward.

Mr. YOUNGER moved the adoption of the report.

The CHAIRMAN, in seconding the motion, said their working during the past year had been exceedingly satisfactory. A large balance was being carried forward; and he concurred in this, with the view that they might be able to reduce the price of gas when the time came for fixing it. They had before them a statement as to the gas manufactured and the costs, dealing with the period since they took over the undertakings in 1888. From this statement, it appeared that the price of gas last year was as low as it ever had been during the experience of the Commissioners, and certainly of the Companies. The gas made per ton of coal was 10,556 cubic feet in Edinburgh, and 10,584 cubic feet in Leith. This, they would find, was much greater than anything

* See JOURNAL, Vol. LXII., pp. 940, 1036.

previously experienced. The quantity of gas produced was 121 million cubic feet greater than it was in 1889-90, the first entire year the gas-works were in the hands of the Commissioners; so that they might congratulate themselves that their enterprise was progressing.

The report was adopted.

ELECTRIC LIGHTING AT HANLEY.

On Thursday, the 26th ult., the Mayor of Hanley (Mr. Alderman E. J. Hammersley) formally opened the electric light station which has been erected for the supply of the borough. The engine-room is 67 ft. 3 in. long and 35 feet wide. The boiler-house, arc-light house, and condenser-house are each 50 feet long and 30 ft. 4 in. wide. There are three Lancashire boilers, each 28 feet long and 7 feet in diameter; and they are capable of working up to a pressure of 140 lbs. per square inch. There are four engines—two 200, and two 100 indicated horse power—of the Brush compound vertical type. The former run at 167, and the latter at 200 revolutions per minute. The four alternators are driven from the engines by means of separate cotton ropes. Two of them run at 430 revolutions per minute, and have a capacity of 100 kilowatts each; while the other two run at 600 revolutions and have a capacity of 50 kilowatts each—the pressure in each case being 2000 volts. The distribution is effected by low-tension distributing mains, at 100 volts pressure, running from the transformer sub-stations. The principal streets are lighted by Brush arc lamps fitted to ornamental posts, and worked from machines independently of the private supply. The bye-streets are to be lighted by incandescent lamps. Alderman J. Shirley, as Chairman of the General Purposes Committee of the Corporation, from which the Electric Lighting Sub-Committee was formed, opened the proceedings, and explained that what they had already done was only a very small matter compared with what they would have to do in future years. Already most of the energy they could supply was bespoken; and within a short time it would be necessary to put down additional engines and dynamos. The amount spent on the installation was £21,000. Mr. Geipel remarked upon the favourable situation of the works, inasmuch as they had plenty of water and land was fairly cheap. He said he did not know any town that had started an electric light installation under more favourable circumstances, or with better chance of success, than Hanley. The way in which the light had been taken up was certainly surprising to electrical engineers. The station was capable of an output of about 10,000 lamps; and he understood the equivalent of 8000 or 9000 lamps had already been applied for. They had therefore already provided an economical working load; and so, what was not always the case, their undertaking would be a success from the very first year. The Committee should do their best to encourage a day load. The difficulty in electric lighting was that everybody came on at a certain hour, while for the rest of the time the plant was comparatively idle. Encouraging a day load, obviated this most undesirable state of affairs. The Mayor remarked that that would be a red-letter day in the history of Hanley. In the year 1877, when their neighbours at Stoke, Burslem, Newcastle, and Longton were enabled to get into their hands the illumination of their own towns, and reap the profits and advantages, Parliament denied Hanley—the leading town of the Potteries—this privilege. The Corporation tried again in 1880 to obtain a favourable decision from Parliament; and three or four years afterwards, at an expense of nearly a couple of thousand pounds to the ratepayers, they tried to get behind the accounts of the British Gaslight Company, who said they were £10,000 in arrear of their statutory dividend. If ever there was a gas company in any part of England who had a chance of making their statutory dividend, it was the British Gaslight Company, who made a revenue of something like £32,000 out of Hanley and Tunstall. Well, for the future the towns would have their own revenue and spend their own money; and there would be no dividends going to London if he could help it. He prophesied that, within twelve months from the time they started, they would have all the light taken up. After some further remarks, his Worship switched on the light amidst loud cheers.

MR. JOHN BURNS, M.P., ON THE ORGANIZATION OF GAS WORKERS.

Speaking at a meeting held last Sunday to celebrate the fifth anniversary of the formation of the Battersea branch of the Gas Workers' and General Labourers' Union, Mr. John Burns, M.P., said that for five years past the gas workers, labourers, and others had enjoyed the advantages of organization; and yet, in spite of the splendid object-lesson which had been shown them, of what organization could do in the shape of shorter hours, the diminution of task-work, and the priceless boon of the eight-hour day, there were many who were not now members of the organization to which they belonged five years ago. He liked the Gas Workers' Union because of the work it had done in municipal as well as in industrial directions, and because it was more catholic in its ideals than any that he knew. Since it was started, there had been too many Labour Unions formed, which vied with and rivalled each other. Instead of seeing, as they had seen in London, one labour organization fighting against another, disintegrating their power and influence, some steps should be taken for amalgamation, by means of which they could concentrate their forces, save expense, and prevent their officials from being overworked. In the face of bad trade, there was a necessity for greater organization, in view of what the Free Labour Association was doing. Wisely and properly met, and on occasion scientifically ignored, he believed that in twelve months' time the Free Labour Association would be unheard of outside the frowsy tap-rooms of low-class neighbourhoods. He did not attach much importance to its operations in the building trade, and the gas workers were sufficiently organized to meet it if they were as intelligent as the officials. In order to succeed, the Association would want men—money it had in plenty; and by reasonable tact and discretion they would be able to circumvent its endeavours. He was glad gas workers had attached more importance to reducing the hours of labour for all than to increasing the wages of the privileged few; and now that the number of the unemployed had increased, and the demands upon the ratepayers were so large, the time had arrived when they should see from what quarter they could get the means by which the workless should be provided with work, and the community relieved from burdens due to the fact that so many were without employment. In regard to the three great Gas Companies of London, which paid away a million and a quarter annually in dividends, the time had arrived when that great City, with its increasing poverty and necessarily high rates, should either do what 200 other towns and cities had done—municipalize its supply, and apply the profits to the reduction of rates—or reduce the standard dividend which the Companies were permitted to enjoy, from 13 per cent. down to 6 or 7. By this means gas would be cheaper, and more men would be employed. It was the community which made the profit for the Companies; and, in return, they should demand a ransom from the Companies. In spite of the eight-hour day, the dividend of the Companies was higher than it was five years ago; and he thought the time had arrived when they should issue a new programme, and demand four shifts per day of six hours each, instead of three of eight hours each. While they were asking for this, they might induce the mechanics to go in for the eight-hour day. (Cheers.) The South Metropolitan Gas Company had recently had their annual beanfeast, and Mr. Livesey had persuaded a real live Duke to go down and praise his profit-sharing system. The Duke had said that profit-sharing was a valuable means of adjusting the relations between capital and labour, but could only be applied when industry showed a profit. To a certain extent he was right; but the combination in that instance only bettered the position of the shareholders and a few of the foremen at the works, and not the unskilled labourer. He (Mr. Burns) contended that profit-sharing was a delusive snare intended to crush the workmen's unions; and if they were wise, they would not have any profit-sharing. Mr. Livesey stated at the same gathering that the men had saved £51,000; but what good was that to them? They were receiving no benefit from it. It was invested, and the shareholders got all the benefits, and not the workmen who had earned it. It was merely a golden link to bind the men to the Company. It was not only at gas-works that the employers made such large profits out of the workmen. The same thing prevailed in nearly every trade; and it was time the community stepped in and endeavoured to better the men's position.

THE EXAMINATIONS IN "GAS MANUFACTURE."

The Question Papers.

We have already given the names of the prize-winners in the last examinations in "Gas Manufacture" conducted by the City and Guilds of London Institute. The following were the questions put to the candidates:—

Ordinary Grade.

1. What do you understand by carbonization, and how is it conducted? 2. Explain the conditions which are essential to good carbonization. 3. How are tar and ammoniacal liquor produced? 4. In what way is lime employed for the purification of gas? Explain its action. 5. What is meant by "8-oz. liquor"? 6. Describe the ordinary tests for ascertaining the purity of gas. 7. Describe the method of determining the illuminating power of gas. 8. Give a sketch of the Referees' sulphur test, and explain its use. 9. How is condensation usually effected? 10. What is a syphon or receiver, and under what circumstances is it necessary to use one?

Honours Grade.

1. What is the proportion of gaseous products yielded by ordinary gas coal, and of what does it chiefly consist? 2. Give a sectional elevation of the side of a purifier, and explain the reason for a determinate depth of water-lute. 3. How may the presence of nitrogen in coal gas be accounted for; and what is its effect upon the illuminating power? 4. Explain the difference between a puddled and a rendered tank, and state how the water-pressure is exerted in each case. 5. Describe any method or system by which hand labour in the retort-house may be reduced or dispensed with. 6. What is the Orsat-Muencke apparatus? Explain its use. 7. Explain the action of a modern gas-retort furnace, as illustrating the principles of economical combustion. 8. Why is it usual to free the gas from ammonia before it enters the purifiers? 9. Describe the process for the manufacture of sulphate of ammonia from gas liquor. 10. Describe a means for obtaining the highest illuminating value from coal gas.

Rotherham Water Supply.—At the meeting of the Rotherham Town Council last Wednesday, Mr. Hirst, in moving the adoption of the recommendations of the Water Committee, intimated that, owing to the downfall of rain, there would be a better supply of water, which would be turned off two hours later in the evening, and turned on two hours earlier in the morning. Among the recommendations of the Committee was one that the Engineer should test the service-pipes which convey the water from Ulley. Mr. Mason said the quantity of water lost between the filter-beds and Rotherham was sufficient to make up the difference between a constant and an intermittent supply, seeing that they were threatened with disease. They therefore ought not to neglect every effort to secure a proper supply of water for domestic purposes. He wished to know what provisions the Chairman was making for expediting the work of testing the service-pipes. Mr. Stoddart explained what was being done, and said they had been in communication with the Sheffield Corporation for a supply of water; but they could not get this except at a cost of something like £2000 a year. This capitalized meant an expenditure of £50,000. He believed they had plenty of water in the area of the borough, if it were properly utilized and looked after.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Peebles oil-gas process is on the "boom" just now. It was the main subject of discussion at the annual meeting of the North British Association last week; it has been prominent in the pages of the JOURNAL; and this week it has received what undoubtedly is the greatest success it has achieved, in its adoption by the Edinburgh and Leith Gas Commission. I have often been surprised that the Edinburgh and Leith Gas Commissioners, whose Engineers are both strongly in favour of the process, and whose reports have been one of the means of procuring its adoption in a number of other places, should have delayed so long in taking a decisive step, one way or another. Of course, they have had difficulties, as Mr. Kinloch Anderson stated last Monday, in the claims that were put forward on behalf of other processes. They have also among them some who, shortsightedly, thought that now that the price of cannel had become moderate, there was no need for their doing anything to keep it down. All this has now been overcome. It has been established beyond question that there is no other system in practical use which gives the results, industrially and financially, which the Peebles process does; it is being demonstrated very forcibly just now that the coal market is not to be depended on; and a new process has been brought out which will be suitable for large works. It is almost a certainty that the new plant will be introduced into the Edinburgh works, which will thus, in all probability, be the first to show, on a working scale, what the capabilities of Mr. Young's latest plant are. In moving the adoption of the process, Mr. Kinloch Anderson made a very sensible speech; bringing forward only such facts as were relevant to the subject, and likely to be of use in convincing his hearers as to the desirability of introducing enrichment.

In connection with the adoption of the Peebles process, the incandescent method of gas lighting also received a lift. Mr. Linton, the Engineer of the Leith Gas-Works, went very closely into the subject; and his report is, like all his work, a thoroughly convincing document. Mr. Linton says that, being anxious to ascertain the effect on the light when using different qualities of gas, he had gas specially prepared in their experimental works of 13 and 18 candle power, as well as of 25-candle power; and the results showed little difference—1 candle power developed per cubic foot of gas ranging from 17·96 candles with 13-candle gas, to 18·44 candles with 25-candle gas. The pressure was 12-10ths of an inch; and the burner consumed 3·44 cubic feet of gas per hour. The photometrical value of the light given was equal to 63·44 standard candles, which worked out to 18·44 candles per cubic foot of gas, as against 5 candles when used in a union-jet; or nearly four times as much light for the same quantity of gas. It might be interesting to compare this with the cost of lighting by incandescent electric lamps. The Corporation of Edinburgh proposed, he understood, to supply electrical energy at 6d. per unit. Seven units would therefore be equal to 1000 cubic feet of gas at 3s. 6d.; and the illuminating value would be: Incandescent electric lamp, 1540 candles; gas in a 5-feet per hour jet, 5000 candles; and gas in an incandescent burner, 18,440 candles.

The Commissioners had another important piece of business before them, in the adoption of their annual accounts, and the disposal of the large surplus they earned last year. The latter they did by placing to the sinking fund double the amount required by their Act of Parliament—a step probably taken in view of the possibility of redeeming annuities from time to time. They also carried forward the large sum of £37,489, against the possibility of a deficit in the current year; the intention being, I understand, to reduce the price of gas by 3d. per 1000 cubic feet. If the reduction be effected, it will bring the price of gas to a lower point than it has ever reached in Edinburgh or Leith. The price will be 3s. 3d.; and the lowest hitherto has been 3s. 4d., at which rate it was sold three years ago.

The annual statement as to the manufacture and cost of gas, submitted by the Engineers, was an elaborate document, dealing not only with the past year, but with every year since 1888, when the Commissioners came into existence. It is too voluminous to summarize; but one or two items in it are worthy of notice. There is, of most importance, the fact that the output of gas, since Whitsunday, 1889, has increased by no less than 121 million cubic feet, which is most satisfactory. Equally gratifying is the statement that the yield of gas per ton of coal has increased from a little over 9000 to over 10,500 cubic feet. This is, no doubt, due to the introduction of regenerative settings and other improved plant, and to the care and attention which have been bestowed upon the work by all the officials and employees. While the Commissioners have thus the pleasure of seeing their undertaking flourishing, it is a satisfaction to see that they have not been unmindful of their workmen. Since they took over the gas undertaking, they have raised the wages of retort-men from 6½d. to 7d. and 7½d. per hour; and of barrowmen, from 5½d. to 6d. per hour. At this week's meeting, also, they agreed to erect, within the Edinburgh works, a dining-hall, reading-room, baths, and conveniences, for their workmen, at a cost of £900. Hitherto the men have not been very well off in the matter of comforts; but now they will be luxuriously housed. By the time The Gas Institute meeting is held in Edinburgh, in June next, there should be something worth looking at in the Edinburgh works, in the new oil-gas plant and the workmen's hall. The Commissioners also, without comment, at this week's meeting adopted a resolution in favour of binding contractors to pay fair wages. They remitted to a Committee to consider as to granting the workmen holidays. Another subject, of pathetic interest, and equally pleasing, was the agreement, unanimously arrived at, to vote a sum of money, in the meantime not to exceed £25, but which may be increased, to the funds of the Workers' Benefit Society, which has been brought into difficulties by the visitation of small-pox. There have been, it was stated, thirteen cases and two deaths in the Edinburgh works, and one case at Leith. The Commissioners were altogether in a handsome mood; and they are to be congratulated upon it. Probably the fine surplus they made upon last year's working had something to do with their genial temperament.

The Coatbridge Gas Company (a summary of whose accounts was given a fortnight ago) held their half-yearly meeting on Tuesday, and adopted the report of the Directors.

The Fife Coal Company, which has a large output of gas coal, has declared a dividend for the past year at the rate of 30 per cent. Their former dividends were as follows: 1892-93, 30 per cent.; 1891-92, 32½ per cent.; 1890-91, 37½ per cent.; 1889-90, 25 per cent.; 1887-8-9, 15 per cent.; 1886-87, 12½ per cent.; and for the four preceding years, 7½ per cent. This large return is explained by the fact that the Company have a low capital, and by the large amount of cannel which they dispose of, upon which there is a greater profit than upon other descriptions of coal.

The Dundee Gas Commission, at their monthly meeting this week, resolved to have a gasholder repaired at a cost of £583. At a private meeting, they considered a subject which has exercised the minds of other Corporations, in connection with the appointment of an Auditor. That duty devolves upon the Sheriff of the County; but when, a month ago, Mr. T. W. Thoms resigned the post, the Commissioners took upon them to recommend Mr. A. Tosh, C.A., of Dundee, for the appointment. This recommendation the Sheriff has since ignored; and he has appointed Mr. John Mess, C.A., of Dundee. The Commissioners feel aggrieved that their recommendation should have been disregarded, and that this should have been done without any reason being given. They could do nothing, however, but express their feelings, with the object of allowing the Sheriff (Mr. Comrie Thomson) to see in the public prints that he had been criticized, for which he will not care one bit. I should say that, knowing the position they occupy with reference to the appointment, if anything out of place has happened in the filling up of it, it was on their part. When the appointment did not lie with them, they should have let it alone.

The coal strike in Scotland has now lasted six weeks; and there are no very pronounced signs of a speedy termination of it. There was this week an appearance of dissension among the masters; those who are unassociated having listened to proposals by the men's leaders that they should be allowed to re-open their pits, on condition that they conceded the men's demand for a restoration of 1s. a day to their wages. The leaders of the men hope, by this means, to split the masters into two parties, and to play off the one against the other. Meantime, the men are being asked to say whether they are willing to accept the position, in the event of the unassociated masters agreeing to it. It is only to come into action in the event of 30,000 men being affected by it. That is one drawback to the scheme; as it is understood that the unassociated masters do not employ so many miners. There is great distress among the families of the men on strike; and in several places soup kitchens and other charities have been opened for their benefit. This is, however, but a drop in a bucket. The proposal to ask Government to interfere seems to have fallen through. A request was made to the Magistrates of Glasgow by a Citizens' Committee, to use their influence in effecting a settlement of the dispute; but they have declined. There is thus little prospect of an early resumption of work. English coal is being received in greater quantities than has yet been the case, which points to the stocks on hand in Scotland when the strike began being almost exhausted.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 3.

Sulphate of Ammonia.—The market is now quite steady; and with the disappearance of pressing second-hand parcels, the outlook is more hopeful, and an improvement may take place after the holidays. There has generally been a much better inquiry this week; and although the amount of business is not large, there is sufficient proof of many inquiries to be filled, and consequently of business to follow. It will be well to bear in mind that there is but a small quantity of sulphate on the market; and that a rise must inevitably result from any large accession of orders. Values are practically unchanged; quotations remaining in the neighbourhood of £13 15s.

LONDON, *Aug.* 3.

Tar Products.—Slightly more activity is noticed in this market. Carbolic and cresylic acids are in fair request; and there is a better demand for creosote and common oils, owing to the shortness of supply. Benzols, however, continue neglected, as also does anthracene. Pitch is firm; and the cooler weather is inducing larger shipments. To-day's values are: Tar, 14s. to 19s. Pitch, 30s. to 32s. Benzol, 90's, 11d.; 50's, 1s. Solvent naphtha, 1s. 4½d. Creosote liquid, 2½d.; ordinary, 1½d. Creosote salts 17s. 6d. Cresylic acid, 1s. Crude benzol naphtha, 30 per cent., 5d. Carbolic acid, 60's, 1s. 7d. Anthracene, "A," 1s. 1d.; "B," 10d.

Sulphate of Ammonia.—There is more inquiry; but not much new business is reported. Stocks are low in makers' hands; and it is believed that dealers have orders, but are waiting to see if the market is likely to be lower. Business has been transacted at prices averaging in all positions £13 12s. 6d. to £13 15s., less 3½ per cent. Gas liquor is quoted at 10s. 6d. to 12s.

Exhibition of Gas Appliances at Greenock.—Under the auspices of the Greenock Gas Trust, Messrs. R. and A. Main recently held an exhibition of gas appliances in the John Street Hall in that town, with practical lessons in cookery by Miss Parker. It was opened by Mr. D. M'Innes, the Convener of the Gas Trust.

Gas Explosion at Blackpool.—Damage to a considerable extent was done by a gas explosion which occurred in the cellars underneath the Royal Hotel, Blackpool, on Saturday morning. It is surmised that the supply-pipe connected with the gas-meter was gnawed through by rats—one, partly burned, being found near the meter.

Extension of the Dewsbury and Heckmondwike Water-Works.—The Board of Management of these works have decided to make a call of £16,000 upon the two proprietorial Authorities—viz., of £12,000 on the Dewsbury Town Council, and of £4000 on the Heckmondwike Local Board—for the purposes of the undertaking. An extension of the works near Dunford Bridge is in progress.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—There is still only a very slow business doing throughout the coal trade of this district; and although colliery proprietors are making every endeavour to maintain present rates, prices have unquestionably a weakening tendency. So far as the wages settlement is concerned, this may now be regarded as definitely accepted on both sides; but minor wages questions are almost certain to crop up frequently. With the object of preventing any serious disturbance of trade from this cause, a local Board of Conciliation is being formed, consisting of two Committees representing the coal-owners and miners respectively, which will be empowered to deal with any questions that may arise outside the general wages settlement, or that does not come under the general Board of Conciliation. All descriptions of round coal are hanging upon the market, and heavy stocks are accumulating, although very few collieries are working more than three to four days per week. In isolated cases, reductions of 6d. per ton have been made on last month's rates; and here and there stocks are being pushed upon the market at rather lower figures. But generally there is no actually quotable alteration. At the pit mouth, prices remain at about 11s. to 11s. 6d. for best Wigan Arley; 10s. to 10s. 6d. for Pemberton four-feet and seconds Arley; 8s. to 8s. 6d. for common qualities of house coal; and about 7s. to 7s. 6d. for steam and forge coal. The minimum figures may, however, be taken as representing more nearly the actual selling price. Engine fuel, which is plentiful, and gradually becomes more of a drug owing to the depressed condition of the manufacturing trade in the district, is offering at very low figures. Common slack can be readily bought at 4s.; with good medium qualities about 4s. 9d. to 5s. 3d.; and some special sorts still quoted at 5s. 9d. to 6s. 3d. per ton at the pit mouth. In the shipping trade, there has been not quite so much doing; and prices are getting back to their old level—9s. per ton being about the full average figure for good qualities of Lancashire steam coal, delivered at the ports on the Mersey.

Northern Coal Trade.—Rather greater activity has been shown in the coal trade of the North-east during the past few days; there having been a sustained demand from Scotland, and also a fairly-full inquiry from local consumers. Locomotive coal has been rather largely sent to Scotland from Tyneside; and as long as the strike effects endure, a considerable quantity will continue to be forwarded. The price is a little above that common here for similar fuel; but it is not high considering the circumstances—about 9s. per ton f.o.r. in many cases. Best Northumbrian steam coals are steadied in price by this additional demand; and from 10s. 9d. to 11s. per ton f.o.b. is the current quotation. Most of the pits producing this class of coals have full work. Second-class steam coals are about 1s. per ton lower than best; while steam smalls are plentiful, and sell at from 4s. 6d. to 5s. per ton f.o.b. Gas coals are rather firmer; the demand is increasing, and the local consumption also enlarges with the lengthening nights. Prices for best Durham gas coals vary from 7s. 3d. to 7s. 9d. per ton; and one or two collieries ask as high as 8s. Of course, the pits are not yet at full work, though the demand is very fair for the season. Manufacturing coals meet with a moderate demand; and there is a plentiful supply. Blast furnace coke is steady, though the shipments are lower than usual. The price of best Durham coke is 13s. 6d. to 14s. 6d., though one or two producers ask 15s. per ton. There is no alteration in the price of gas coke; and the production continues to be well taken up.

Scotch Coal Trade.—The same conditions prevail so far as the selling of coal in Scotland is concerned. The purchase of coal by Scotchmen from English sellers is now almost the only trade which is being carried on. Any Scotch coal which there is left to sell is mostly in Fifeshire; and the prices asked for it, delivered in Glasgow, are from 16s. to 16s. 6d. per ton—nearly double the rate before the strike among the miners began. Lancashire coal is relatively cheaper; being quoted in Glasgow at from 9s. 6d. to 10s. per ton. This cheap rate may point to a desire on the part of English coalowners to get a footing in Scotland. Looked at in relation to the extra heating power of the English coal, it is, for manufacturers, relatively cheaper than what Scotch coal was bought for before the strike. Shipments for the past week amounted to 24,246 tons—an increase as compared with the previous week of 300 tons, but a decrease as compared with the corresponding week of last year of 121,842 tons. For the year to date, the total shipments have been 3,692,291 tons—a decrease as compared with the corresponding period of last year of 201,574 tons.

The Price of Gas in London.—At the meeting of the London County Council last Tuesday, Mr. Westacott asked the Chairman of the Public Control Committee whether, having regard to the fact that, since a recent decision of the Council, The Gaslight and Coke Company had intimated their intention of reducing their charge for gas, it was proposed to act upon that decision, which was to apply to the Home Secretary for an inquiry into the cause of the difference in the rate prevailing on the north and south sides of the Thames. Sir G. Harris said his attention had been called to the proposed reduction. He did not know whether or not it had any connection with the recent decision of the Council; but there was nothing to prevent the Company altering their charges again, and so the Committee would certainly ask for the inquiry.

Fire at the South Metropolitan Gas-Works.—The news that a fire had broken out at the South Metropolitan Gas-Works caused considerable excitement in the Old Kent Road on Saturday evening. Shortly before six o'clock, smoke was noticed rising from the Canal Bridge portion of the works; and the employees soon had their manual engine at work. The flames were raging in a building of two floors—60 feet by 40 feet—where the manufacture of water gas is carried on. An alarm was given to the Metropolitan Fire Brigade, and several engines were soon present; but, in the meantime, the men at the works had got the fire well in hand, and it was prevented from spreading. Considerable damage was done to the building in which it originated. The fire is supposed to have been caused through oil boiling over into the furnace.

Sales of Shares.—At the Mart, Tokenhouse Yard, on Monday last week, Messrs. J. Hibbard and Sons sold £1900 of "A" stock of *The Gaslight and Coke Company* for £4494; £175 of "A" stock of the *South Metropolitan Gas Company* for £543; £3200 of "B" stock for £8337; £425 of old stock of the *Commercial Gas Company* for £1105; £93 of new stock for £180; and £5400 of ordinary stock of the *East London Water-Works Company* for £12,110.——A number of 7 per cent. shares in the *Spalding Water Company* were recently sold at £12 15s. and £12 17s. 6d. each.

The Rotherham Corporation and their Coal Contracts.—At the meeting of the Rotherham Town Council last Wednesday, a long discussion took place on the subject of letting the coal contracts for the ensuing year. The Gas Committee recommended that the total bulk —14,500 tons—should be apportioned between three collieries, as follows: (1) 7000 tons, at 8s. 9d. per ton; (2) 6000 tons, at 8s. 11d. per ton; and (3) 1500 tons, at 8s. 6d. per ton. An amendment was brought forward to make the apportionments as follows: (1) 7000 tons, (2) 4000 tons, (3) 3500 tons; the mover remarking that the Company to whom the third contract was to go had plant and offices which were, for the most part, in the borough, whereas no revenue was derived from the connection of No. 2 with the borough. The Chairman of the Committee (Mr. Stoddart) said he could not accept the amendment, for, if they had gone by the results of the tests, No. 3 ought to have been left out altogether. But the Committee had met the views of certain parties who desired that a portion of the tenders should be given to local firms. He gave the results of the tests; and in doing so mentioned that during the recent strike they had had to pay 20s. per ton for some of the greatest rubbish that ever went into a gas-works. If it were now offered at 5s. per ton, he would not recommend them to buy it. As they were aware, prices of coal were going down, and for what was sold at 10s. 5d. a ton six months ago, firms were glad to take 8s. 9d. per ton now. He knew for a fact that one of the firms tendering for coal at 10s. per ton six months ago was now selling it—and they had the carriage to pay—at from 7s. to 7s. 6d. per ton. The amendment was lost. A further amendment was submitted to give the first two contracts to other firms; but, after some discussion, this was also lost. It was then moved that only half the contracts should be given out; but this was rejected, and the Committee's recommendation adopted.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 273.)

Issue.	Share	When ex-Dividend.	Dividend or Div. + Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	**GAS COMPANIES.**				£ s. d.
590,000	10	12 Apl.	10½	Alliance & Dublin 10 p. c.	10	18—19	..	5 10 6
100,000	10	,,	7½	Do. 7 p.c.	10	13½—13¾	..	5 11 1
300,000	100	2 July	5	Australian (Sydney) 5 % Deb.	100	105—107	..	4 13 4
100,000	20	14 June	8	Bahia, Limited	20	9¼—10¼	..	15 3 10
200,000	5	11 May	6½	Bombay, Limited	5	5⅞—5⅞	..	5 13 0
40,000	5	,,	6½	Do. New	4	4—4½	..	5 15 6
380,000	Stck.	28 Feb.	11½	Brentford Consolidated	100	225—230	..	5 0 0
180,000	,,	,,	8½	Do. New	100	173—178	..	4 15 6
220,000	Stck.	15 Mar.	11½	Brighton & Hove Original	100	210—215	..	5 6 11
888,500	Stck.	28 Feb.	5	Bristol	100	113—116	..	4 6 2
320,000	20	29 Mar.	11½	British	20	47½—48½	..	4 12 9
50,000	10	28 Feb.	11½	Bromley, Ordinary 10 p. c.	10	21½—22½	..	5 2 2
51,510	10	,,	8½	Do. 7 p. c.	10	16½—17½	..	4 17 2
328,750	10	28 June	2	Buenos Ayres (New) Limited	10	5⅜—6	..	3 6 8
200,000	100	2 July	6	Do. 6 p. c. Deb.	100	98—101	..	5 18 10
150,000	20	12 July	8	Cagliari, Limited	20	25½—26½	..	6 0 8
550,000	Stck.	12 Apl.	12½	Commercial, Old Stock	100	263—268	+3	4 13 3
165,000	,,	,,	9½	Do. New do.	100	195—200	+2	4 15 0
160,762	,,	14 June	4½	Do. 4½ p. c. Deb. do.	100	132—137	..	3 5 8
800,000	Stck.	14 June	13	Continental Union Limited	100	237—242	..	5 7 5
200,000	,,	,,	10	Do. 7 p. c. Pref	100	210—215	..	4 13 0
535,000	Stck.	28 Feb.	5	Crystal Palace Ord. 5 p.c. Stk	100	105—110	..	4 10 11
486,090	10	27 July	11	European, Limited	10	23—24*	..	4 11 8
354,060	10	,,	11	Do. Partly paid	7½	16—17*	..	4 17 1
5,646,590	Stck.	14 Feb.	12	Gaslight & Coke, A, Ordinary	100	245—250	+2½	4 16 0
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	100—104	..	3 16 11
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	275—280	..	3 11 5
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	130—135	..	3 14 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	192—195	..	3 16 11
1,300,000	,,	,,	7	Do. H, 7 p. c. max	100	180—185	+2	3 15 8
463,000	,,	,,	10	Do. I, 10 p. c. Prf.	100	272—277	..	3 12 3
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	100	167—172	..	3 9 9
1,061,150	,,	14 June	4	Do. 4 p. c. Deb. Stk.	100	127—130	..	3 1 6
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	132—137	..	3 5 8
908,000	,,	,,	6	Do. 6 p. c. do	100	175—180	..	3 6 8
3,800,000	Stck.	11 May	12	Imperial Continental	100	222—227	..	5 5 8
75,000	5	14 June	6	Malta & Mediterranean, Ltd.	5	4½—5	..	6 0 0
560,000	100	2 Apl.	5	Met. of Melbourne, 5 p. c. Deb.	100	109—111	..	4 10 1
541,920	20	14 June	5	Monte Video, Limited	20	14½—15½	..	6 9 0
150,000	5	30 May	8	Oriental, Limited	5	6¾—6¾	+⅛	5 18 6
60,000	5	29 Mar.	7	Ottoman, Limited	5	3¾—4¼	..	7 7 4
166,870	10	31 Jan.	2	Pará Limited	10	1¾—2	..	10 0 0
				People's Gas of Chicago—				
480,000	100	2 May	6	1st Mtg. Bds.	100	102—107	..	5 12 1
500,000	100	1 June	6	and Do.	100	95—100	..	6 0 0
150,000	10	26 Apl.	6	San Paulo, Limited	10	9—10	..	6 0 0
500,000	Stck.	28 Feb.	15½	South Metropolitan, A Stock	100	322—327	..	4 14 9
1,350,000	,,	,,	12	Do. B do.	100	270—275	+2	4 7 3
260,000	,,	,,	13	Do. C do.	100	278—283	..	4 11 10
750,000	,,	12 July	5	Do. 5 p. c. Deb. Stk.	100	155—160	..	3 2 6
60,000	Stck.	28 Feb.	11½	Tottenham & Edm'nton, "A"	100	215—220	..	5 4 7
				WATER COMPANIES.				
746,011	Stck.	28 June	10	Chelsea, Ordinary	100	283—288	+1	3 9 5
1,720,252	Stck.	12 Apl.	8	East London, Ordinary	100	228—233	+1	3 8 9
544,440	,,	28 June	4½	Do. 4½ p. c. Deb. Stk.	100	147—152	..	2 19 2
700,000	50	14 June	8½	Grand Junction	50	119—123	..	3 9 1
708,000	Stck.	28 Feb.	11½	Kent	100	298—303	..	3 15 11
1,043,800	100	28 June	9½	Lambeth, 10 p. c. max.	100	258—263	+1	3 12 3
406,200	100	,,	7½	Do. 7½ p. c. max.	100	207—210	+1	3 11 5
330,000	Stck.	29 Mar.	4	Do. 4 p. c. Deb. Stk.	100	132—135	..	2 19 3
500,000	100	14 Feb.	12½	New River, New Shares	100	377—382	+2	3 3 6
1,000,000	Stck.	27 July	4	Do. 4 p. c. Deb. Stk	100	134-137*	..	2 18 4
902,300	Stck.	14 June	6	S'thwk & V'xhall, 10 p. c. max.	100	168—173	..	3 9 4
126,500	100	,,	6	Do. D 7½ p. c. do.	100	149—152	..	3 19 0
1,155,066	Stck.	14 June	10	West Middlesex	100	273—273	+3	3 12 0

*Ex div.

The Boughton Blean Gas and Coke Company, Limited, has been registered with a capital of £1500, in £1 shares, to acquire the business of a Company with a similar title, and to supply gas in the parish of Boughton-under-the-Blean, in Kent.

The Maintenance of Incandescent Gas-Lights.—At the Westminster County Court, last Tuesday, his Honour Judge Lumley-Smith, Q.C., disposed of the case of *The Incandescent Gas-Light Company v. Bacon*. It was a claim for £10 14s. 6d; for the maintenance of gas-burners supplied by the Company to the defendants. It was explained, on behalf of the plaintiffs, that the defendants—Messrs. Bacon Bros., of King's Cross—ordered, and were supplied with, a number of incandescent gas-lights, which plaintiffs had maintained and had not been paid for. The first mantles were charged for at 1s. 6d.; but they produced an improved one, at 2s. 6d., and it was explained to defendants that, unless they had this new mantle, plaintiffs must discontinue the maintenance. For the defence, it was stated that Messrs. Bacon had expended a large sum on these lights for their various public-houses. They had first of all to pay for the fixing; then there was a 1s. 6d. improved mantle; then came another that was going to save gas; and at last there was another—a very great improvement—at 2s. 6d. Defendants began to wonder when it would end, and thought the whole thing was an imposition. Plaintiffs then refused to supply any mantles at 1s. 6d. He thought defendants were entitled to damages. His Honour said he could not see that, unless there was an agreement to maintain; but there was no such agreement. He thought plaintiffs should supply defendants with mantles at the old rate. Plaintiffs must have judgment, but without costs.

Newport (Salop) Water Supply.—After a good many years' delay, the Newport (Salop) Local Board last Wednesday let the various tenders for the water-works to supply the town. They include the following: Tank and pumping-station, £673; iron pipes, £514; laying do., £240; engines and machinery, £622. All the work is to be completed by the 5th of November next. The town possesses a supply of excellent water, which does not naturally rise to a level high enough to be distributed by gravitation with sufficient force to give a good flow at the higher parts of the town. Complaints have been frequently made, and all sorts of expedients tried, short of providing proper water-works. Now, however, these have been fairly started; and an improved condition of things may consequently be looked for.

Stourbridge Gas Supply.—At the meeting of the Stourbridge Improvement Commissioners on Monday last week, the Gas Committee presented their quarterly report, in which they stated that altogether there were now in use 430 gas cooking-stoves and 400 prepayment meters, and others were on order. During the past year there had been 1,746,500 cubic feet of gas consumed by these meters; and the Committee were gratified at discovering that these instruments were so much appreciated. During the first three months of the current financial year, the sale of gas to private consumers was 10,719,000 cubic feet—an increase of 2,271,200 feet over the corresponding quarter; and the sale of gas for public consumption was 1,780,100 cubic feet, or a rise of 124,300 feet. The Committee considered these results satisfactory. The Committee also presented a special report relative to taking up £4000 of the £5000 loan they had been authorized by the Local Government Board in March last to obtain for the purposes of the gas undertaking. The reports were adopted.

GWYNNE & BEALE'S
PATENT GAS EXHAUSTERS AND ENGINES.

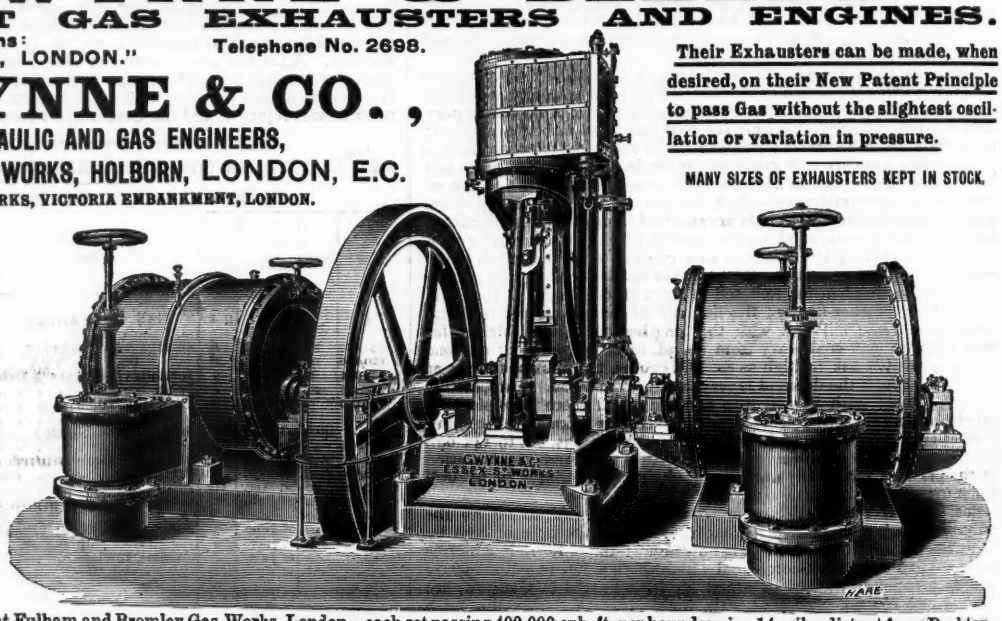
Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 2698.

GWYNNE & CO.,
HYDRAULIC AND GAS ENGINEERS,
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.
Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

They have completed Exhausters to the extent of 32,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM, PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.



Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.

Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.
Catalogues and Testimonials sent on application.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

GAS PURIFICATION AND CHEMICAL COMPANY LIMITED.

ANDREW STEPHENSON, Agent. All communications *re* OXIDE to be addressed to PALMERSTON BUILDINGS, E.C.

WINKELMANN'S "VOLCANIC" CEMENT. Fire Resistance up to 4500° Fahr. In use in most Continental Gas-Works, and in more than 200 British Gas-Works. [See Advt., p. 115.]
ANDREW STEPHENSON, 182, Gresham House, Old Broad Street, LONDON, E.C. Telegrams: "Volcanism, London."

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for, Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."

JAMES LAWRIE & Co. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

W. C. HOLMES & CO., Huddersfield; AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 302 of this Week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, Leeds, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality
Sample and Price on application.
OXIDE PAINTS, OILS, SULPHURIC ACID, &c
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

OXIDE OF IRON.

FINEST Quality of Natural Bog Ore.
Particulars and price, apply to Mr. T. L. ARCHER, 20, Fennel Street, MANCHESTER.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS, MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1769.
GAS PLANT CEMENT
FOR ALL LEAKAGES.

AMMONIACAL LIQUOR Wanted.
BROTHERTON AND Co., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS TAR Wanted.
BROTHERTON AND Co., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPENT OXIDE Wanted.
BROTHERTON AND Co., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

ALWAYS a Buyer of Spent Oxide, Tar, and AMMONIACAL LIQUOR.
Apply to J. HARDMAN, Milton, STAFFORDSHIRE.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E. and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

REDHILL GAS-WORKS ASSESSMENT APPEAL.

THE Report of the proceedings at the hearing of the APPEAL of the REDHILL GAS COMPANY against the RATING OF THEIR PROPERTY in Reigate and Nutfield which was published in the JOURNAL has been reprinted (by desire) in Pamphlet form; and copies can be obtained, on application to the PUBLISHER, *price 4d. each.*

WANTED, by a single Man (aged 28), a SITUATION on a Gas-Works, as STOKER or HANDY MAN. Six Years' experience. Good References.
Address, H. BARNES, Tyler's Green, near Amersham, BUCKS.

SERVICE Layer and General Fitter for Wrought and Cast Ironwork wanted immediately by a Gas Company in South Wales.
Apply, by letter, with Character, to No. 2411, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Directors of the Cork Gas Consumers' Company are prepared to receive APPLICATIONS from Persons competent to take charge of the Distribution Department, and all Outside Work of the Company.
Applicants to state Age, Experience, Salary required, and further Particulars, by letter addressed to the Secretary.
By order,
DENNY LANE,
Secretary.
72, South Mall, Cork,
July 27, 1894.

OFFICINA COMUNALE DEL GAS ILLUMINANTE, TRIESTE.

NOTICE is Hereby Given, that the Municipal Gas-Works (Officina Comunale del Gas Illuminante), making 6 Million Cubic Metres of Gas per Annum, requires the services of a MANAGING DIRECTOR.
Applicants must have acquitted themselves creditably at a Technical High School; must have already managed a Gas-Works of well-known standing; and are required to be acquainted with the Italian language. Preference will be given to persons with experience in Electrical Engineering and Water Supply.
Applications to be sent before the 10th of September next, to the Gas-Works Committee (Consiglio d'Amministrazione) in Trieste, Via del Campanile No. 6, where further particulars may be obtained.

SMALL Gas Exhauster and Engine complete wanted.
BROTHERTON AND Co. Commercial Buildings, LEEDS.

CYANIDES.

WANTED, Particulars of manufacture from Gas Liquor and Spent Oxide. Communications treated confidential.
Mr. BROTHERTON, Commercial Buildings, LEEDS.

FOR SALE—One 10-inch Station Governor, in good condition.
Particulars on application to STEPHEN TEMBLETT, Gas-Works, ANDOVER.

RE THE MAURITIUS GAS COMPANY, LIMITED (IN LIQUIDATION).

THE Port Louis Gas-Works, Land, PLANT, BUILDINGS, MACHINERY, FIXTURES, ACCESSORIES, and STOCK TO BE SOLD BY TENDER, in One Lot, by order of the Liquidator.
Tenders will be opened in London on Oct. 10, 1894.
Particulars and Forms of Tender of the Hon. HENRI ADAM, Port Louis, MAURITIUS; of THOS. H. E. FOORD, Esq., Solicitor, 16, Philpot Lane, LONDON; or of Messrs. EASTMAN BROS., Auctioneers, 28, Bucklersbury, LONDON.

NORTH OF IRELAND

ASSOCIATION of GAS MANAGERS.

THE

ANNUAL MEETING

Of this Association

WILL BE HELD IN THE

GAS-WORKS, ARMAGH,

ON TUESDAY, AUGUST 14, 1894.

The Chair to be taken at 11.30 a.m. by the President, Mr. C. B. OUTON, Wh.Sch.

The business will consist of the Inaugural Address; Papers by Messrs. Featherstone and Hurll, on "A Fifty-Feet Diameter Gasholder, with Specification, Quantities, and Estimate," and on the "Manufacture of Fire-Clay Gas Retorts, and the Advantages of having Standard Sizes;" and a Conversation on "Experiences in Purification."

The Members will dine together in the Beresford Arms Hotel, at Four p.m. Tickets, 4s. each, to be had from the Secretary. *It is important that Dinner Tickets should be secured not later than the 10th of August.*

On Wednesday, it has been arranged for the Members and their Lady Friends to have an Excursion to Warrenpoint (for Rostrevor). The Train leaves Armagh at 10.30 a.m.; Luncheon at Beach Hotel at 1 p.m.; Tea at 5.30 p.m.; Return Train leaves Warrenpoint at 7.10 p.m. Tickets for Excursion, to include Train Fares, Lunch, and Tea, 4s. 6d. each person. Early application for these is necessary, as the number must be guaranteed.

JAMES WHIMSTER,
Hon. Secretary.
Gas-Works, Armagh, July 26, 1894.

STATION Meter for Sale, in Cylindrical Case. No connections; former ones, 8-inch. Capacity, 7000 to 10,000 cubic feet per hour; has passed 13,000. Removed for a larger one. No defects of registration. Outside Dimensions, 6 feet diameter by 4 ft. 2 in. Price, £30. Can be had at once.
Apply to GEORGE ANDERSON, 35A, Great George Street, WESTMINSTER.

STOCKTON-ON-TEES CORPORATION.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Corporation invite TENDERS for the supply, in whole or in part, of 30,000 tons of GAS COAL, for the Year ending Aug. 31, 1895.
Particulars and Form of Tender can be obtained on application to the undersigned at the Gas-Works.
Tenders, sealed, and endorsed "Tenders for Gas Coal," to be sent in not later than noon of the 29th day of August, 1894, addressed to M. B. Dodds, Esq., Town Clerk, Stockton-on-Tees.
The Gas Committee do not bind themselves to accept the lowest or any tender.
WILLIAM FORD,
Engineer and Manager.
Stockton-on-Tees,
Aug. 4, 1894.

CAMBRIDGE UNIVERSITY AND TOWN GAS-LIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of Best Well-Screened GAS COAL, NUTS, and CANNEL, to be delivered between the 1st of September, 1894, and the 30th of June, 1895.
Forms of Tender and Specification may be obtained on application to the undersigned.
Sealed tenders to be sent to the Chairman of the Company, not later than the 20th day of August inst., endorsed "Tender for Coal."
The Directors do not bind themselves to accept the lowest or any tender.
By order,
O. J. WEEKS,
Manager.
Gas Office, Cambridge,
Aug. 1, 1894.

CORPORATION OF LEICESTER.

SULPHURIC ACID.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for the supply of SULPHURIC ACID, made either from Native Sicilian Brimstone, recovered Sulphur, or Pyrites.
Specific gravity in each case to be stated. The Price to include free delivery by rail into elevated tanks, 27 feet high, at the Chemical Works, Aylestone Road Gas-Works. Probable quantity, about 1200 tons, to be delivered as required during the ensuing Twelve Months.
Tenders, addressed to Alderman Lennard, Chairman, and endorsed "Tender for Acid," to be delivered at these Offices not later than Eleven o'clock a.m. on Tuesday, Aug. 21.
The Committee do not bind themselves to accept the lowest or any tender.
ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.
Gas Offices: Millstone Lane, Leicester,
Aug. 4, 1894.

MARRIAGES.

GIBBONS—STEVENSON.
HEWITT—STEVENSON.

AT St. Mary's, Crumpsall, Manchester, by the Rector, on July 25, WILLIAM PIKE GIBBONS, of Ruiton House, Dudley, third son of the late B. Gibbons, J.P., of Edgbaston, to VIOLET MARY STEVENSON, eldest daughter of G. Ernest Stevenson, M.Inst.C.E.; and at same time, EDGAR HEWITT, Solicitor, of Higher Broughton, to FLORENCE MAUD STEVENSON, third daughter of Mr. Stevenson.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of about 120 tons of SULPHURIC ACID suitable for making Sulphate of Ammonia.
Specification and Form of Tender may be obtained on application to Mr. W. Whatmough, Gas Manager.
Contractors tendering for this work must pay their workpeople at least the standard or trade union rate of wages, and observe the trade conditions which attach to the various kinds of work for which the tender is sent in.
Tenders, endorsed "Acid," to be sent to the undersigned not later than Tuesday, Aug. 14, 1894.
By order,
A. B. PILLING,
Town Clerk.
Municipal Buildings, Heywood,
Aug. 1, 1894.

HEYWOOD CORPORATION GAS-WORKS.

TENDERS are invited for Steam Tubes and FITTINGS.
Particulars from Mr. W. Whatmough, Gas Manager.
Contractors tendering for this work must pay their workpeople at least the standard or trade union rate of wages, and observe the trade conditions which attach to the various kinds of work for which the tender is sent in.
Tenders, endorsed "Tubes and Fittings," to be sent to the undersigned not later than Tuesday, Aug. 14, 1894.
By order,
A. B. PILLING,
Town Clerk.
Municipal Buildings, Heywood,
Aug. 1, 1894.

HINCKLEY LOCAL BOARD.
(GAS DEPARTMENT.)

TENDERS FOR TAR.

TENDERS are invited for the surplus TAR produced during the period of One Year from the 1st of September next.
Particulars and Forms of Tender to be had from the undersigned.
Tenders, sealed, and endorsed "Tar," to be delivered on or before Tuesday, Aug. 21, to
G. HELPS,
Engineer and Manager.
Hinckley, Aug. 5, 1894.

COUNTY BOROUGH OF WIGAN.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the Wigan Corporation invite TENDERS for the surplus TAR produced at their Gas-Works, over a period of One, Two, or Three Years, commencing on the 1st of September, 1894.
Particulars and Form of Tender may be obtained on application to the undersigned.
The highest tender not necessarily accepted.
Tenders, sealed and endorsed "Tar," to be delivered to A. Smith, Esq., Town Clerk, on or before Aug. 14 next ensuing.
JOS. TIMMINS,
Engineer, &c.
Borough Gas-Works, Wigan,
July 26, 1894.

BOROUGH OF CHORLEY.

CORPORATION GAS-WORKS.

THE Chorley Corporation invite Tenders for the purchase of the surplus TAR produced at their Gas-Works for Twelve Months commencing the 1st of September next, delivered in the Contractor's takns at either of the Chorley Railway Stations.
Any further Information may be obtained from Mr. R. Fearnley, Gas Manager, Chorley.
The Corporation do not bind themselves to accept the highest or any tender.
Tenders, endorsed "Tar," to be sent to me on or before Wednesday, the 15th of August next.
By order,
JNO. MILLS,
Town Clerk.
Town Hall, Chorley,
July 28, 1894.

BOROUGH OF CHORLEY.

CORPORATION GAS-WORKS.

THE Chorley Corporation invite Tenders for Twelve Months' supply of the following for their Gas-Works:—
1. GAS COAL, SLACK, and NUTS, 7000 tons.
2. CANNEL, 500 tons.
3. LIME.
4. VITRIOL, 80 tons.

The supply to commence on the 1st day of September next.
Forms of Tender for Coal, Cannel, and Vitriol, and any further Information, may be obtained on application to Mr. Fearnley, Gas Manager.
Tenders, duly endorsed, to be sent to me on or before Wednesday, the 15th of August next.
The Corporation do not bind themselves to accept any tender.
By order,
JNO. MILLS,
Town Clerk,
Town Hall, Chorley,
July 28, 1894.

TAR AND AMMONIACAL LIQUOR.

THE Bognor Gaslight and Coke Company, Limited, invite TENDERS for the surplus TAR and LIQUOR produced at their Works, over a period of One or Two Years, commencing from the 1st of September, 1894.

Any further Information may be obtained from the undersigned, to whom tenders must be sent in, on or before the 22nd of August, 1894.

The highest or any tender not necessarily accepted.

WM. HAMMOND,
Secretary, &c.

Bognor, Aug. 2, 1894.

LEIGH LOCAL BOARD.

THE Gas Committee of the Leigh Local Board invite TENDERS for the purchase of the surplus TAR produced at their Gas-Works for a period of One Year from the 1st of September next.

All Particulars, with Form of Tender, may be had from the undersigned.

Sealed tenders, endorsed "Tar," and addressed to the Chairman of the Gas Committee, to be delivered at the Town Hall, Leigh, on or before Monday, the 13th of August next.

The highest or any tender not necessarily accepted.

ALFRED T. FLETCHER,
Engineer and Manager.

Gas-Works, Leigh, Lancs.,
July 31, 1894.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors in the above Company will be held at the Guildhall Tavern, Gresham Street, in the City of London, on Thursday, the 23rd day of August, 1894, at half past twelve o'clock in the afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th day of June last; to Declare a Dividend; and to transact the General Business of the Company.

AND NOTICE IS HEREBY FURTHER GIVEN, that immediately after the transaction of the business of the above Meeting, an EXTRAORDINARY MEETING of the Proprietors in the above Company will be held for the purpose of authorizing the raising, by the creation and issue of New Ordinary Shares of £10 each (nominal value) or Stock of the Company, a sum not exceeding in the whole £100,000 in the proportions following—viz.,

"D" Capital .. Gas . £33,200
"D" Capital .. Water £66,800

as authorized by the Barnet District Gas and Water Act, 1883; and also to authorize the borrowing on Mortgage of the Undertaking £3125 in respect of each £12,500 forming part of the above £100,000 "D" Capital of the Company; and also to consider and determine as to the passing of a Resolution for the conversion or consolidation into "D" Capital Water Stock of the Company of 5000 Fully-Paid-Up "D" Water Shares of £10 each, forming part of the Additional Capital authorized to be raised by the Company's Act of 1883, such Stock to be divided amongst the holders entitled to the said Shares, according to their respective interests therein.

The Transfer Books will be closed from the 10th to the 23rd of August, both days inclusive.

By order of the Board,
ALFRED LASS,
Secretary.

Offices 30, Gracechurch Street, London,
July 27, 1894.

Price 2s. per dozen, or 10s. 6d. per 100, post free.

CONSPIRACY and Protection of Property Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

***** *The Act extends to Scotland and Ireland.***

HOLMSIDE GAS COALS.

(Wrought out of Holmside and South Moor Collieries.)

PRESENT production 4000 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16½ candles. The Sulphur is about 1 per cent., and the Ash 1¾ per cent. The Coal cokes well, and leaves about 70 per cent. of excellent Coke. To show the progress of HOLMSIDE COALS, it may be mentioned that the quantity carbonized by the London Gas Companies in 1885 was about 200,000 tons; whereas the present consumption of HOLMSIDE COALS in London alone is at the rate of nearly

600,000 Tons per Annum

Full particulars on application to

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-ON-TYNE.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cubic feet.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For prices, f.o.b, Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.
B Lombard Street,
NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

LOW MOOR BLACK BED
GAS COAL.

YIELD OF GAS PER TON · 10,375 CUBIC FEET.
ILLUMINATING POWER · 17·50 SPERM CANDLES.
COKE · · · · · · · 75 PER CENT.

Prices, f.o.r. or f.o.b, on application to

GEORGE & JOHN HAIGH,
RAVENS LODGE AND CONYERS' COLLIERIES,
DEWSBURY.

A TRIAL IS RESPECTFULLY SOLICITED.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.

Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton .	10,500	Cubic Feet.
Illuminating Power .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Bombay Gas Company, Ipswich Gaslight Company, Devonport Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the

HARTON COAL COMPANY,
LIMITED,
Newcastle-on-Tyne.
W. H. PARKINSON,
FITTER.

ROBERT MARSHALL,
CANNEL COAL MERCHANT
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

CAST-IRON PIPES
FOR GAS AND WATER.

Pipes, One to Six inch Bore, kept in Stock. Also a very large assortment of all sizes of Bends, T-pieces, and Specials ready for despatch on receipt of Order.

VALVES
FOR GAS, WATER, AND STEAM.

TELEGRAMS: "PIPES GLASGOW."

WM. MACLEOD & CO.,
66, ROBERTSON STREET, GLASGOW.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C

HUNTER'S

OXIDE OF IRON.

JAMES HUNTER, LESSEE, MINER, AND SHIPPER OF

NATURAL IRISH BOG ORE.

This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.

Samples and Prices on application.

11, BAY STREET, PORT GLASGOW.

Telegrams: "HUNTER, PORT GLASGOW."

Established 1872.

THE DRUM

FOR PUMPING AIR, WATER, SEMI-FLUIDS, &c.

See Advertisement in last and next issue.

THE

AUTOMATIC MACHINERY

for the Magnificent New Retort-House and Coal-Stores at Rochdale will be arranged for

INSPECTION

FROM THE

8th till the 18th of August;

and we cordially invite Gas Engineers and Managers to visit our works at Aberdeen.

NEW CONVEYOR Co.,

LIMITED,

3 & 4, Lime St. Square,

LONDON.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

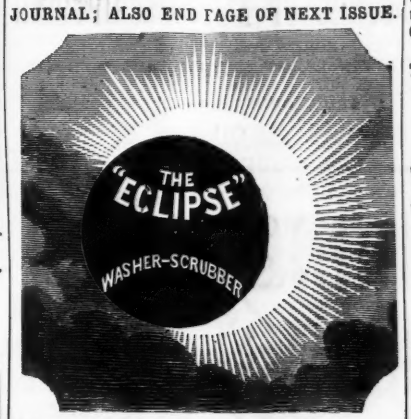
THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

SEE ADVT., p. 260 OF LAST WEEK'S JOURNAL; ALSO END PAGE OF NEXT ISSUE.



CLAPHAM BROS., Ld., Keighley, Yorks.

T. B. KITTEL, SHEFFIELD.

CONTRACTS FOR SUPPLIES OF ANY OF THE PRINCIPAL

ENGLISH & SCOTCH CANNELS.

REAL SILKSTONE GAS COAL

ANALYSIS AND PRICES ON APPLICATION.

T. B. KITTEL, SHEFFIELD.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON AND COAL COMPANY, Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

The Analysis made by Messrs. J. and H. T. Pattinson, Public Analysts for Northumberland, gives 10,500 cubic feet of Gas per ton, with an Illuminating Power of 16·3 Candles and 67·3 per cent. of Coke. The following is a Working Analysis made of these Coals by the Tudhoe and Sunderland Bridge Gas Company:—

[COPY.]

TUDHOE AND SUNDERLAND BRIDGE GAS COMPANY.

Tudhoe Gas-Works,
Spennymoor,
8th June, 1893.

MESSRS. The

WEARDALE IRON & COAL COMPANY, LTD.

GENTLEMEN,

For the last two months we have used your **THORNLEY GAS COAL** exclusively at these gas-works; and I have pleasure in herewith giving you the actual results obtained during the trial.

Yield of Gas per ton: 10,300 cubic feet.
Yield of Coke: 13½ cwt.

Illuminating Power of Gas, average of a series of tests, **17 Sperm Candles.**

The Coke was of excellent quality.

The following is a complete ultimate Analysis of the Coal.

	PER CENT.
Carbon	83·128
Hydrogen	5·116
Oxygen	7·401
Nitrogen	0·585
Sulphur	0·620
Ash	3·130
Water	0·020
	100·000

Analysis of the Coke.

Carbon	93·31
Sulphur	0·61
Ash	5·00
Moisture	1·08
	100·00

I am, Gentlemen,
Yours truly,
A. B. COWAN,
Manager.

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

PHILADELPHIA EXHIBITION, 1876.

ALSO SILVER MEDAL, PARIS.

The Highest Award for Gas-Retorts and other Goods in Fire-Clay has been awarded to KING BROTHERS for their Goods made from their renowned Stourbridge Fire-Clay.

KING BROTHERS,

Proprietors of

STOURBRIDGE CLAYS,

Manufacturers of

Fire-Bricks, Tank Blocks, Glass-House Bricks and Pots, Gas-Retorts, Crucibles in Clay and Plumbago, Gas-Oven Bricks, Bricks for Regenerator Furnaces and Hot-Air Stoves.

STOURBRIDGE, ENGLAND.

CRUCIBLE MANUFACTORY, 46, PENN STREET, CURZON STREET, BIRMINGHAM.

N.B.—Gas, Blast-Furnace, and Glass-House Bricks and Glass-House Pots always in Stock, or made on the Shortest Notice.

TAR AND LIQUOR PURCHASED.

JOHN CLARKSON MAJOR,

(Established 1851,)

Tar Distiller and Manufacturing Chemist,

WOLVERHAMPTON.

ARMSTRONG'S

PATENT

CANDLE SAFETY LAMPS.

Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.

43, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

THOMAS TURTON

AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES,

SPANNERS, RATCHET BRACES, LIFTING JACKS,

ANVILS, VICES,

AND ENGINEERS TOOLS GENERALLY.

London Office:

90, CANNON STREET, E.C.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

PRICE'S PATENT COKE & COAL BARROW

effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, 22, Alwyne Road, Canonbury, LONDON, N.

Prices are Reduced.

TELEGRAPHIC ADDRESS: "ROBUSTNESS, LONDON." EXCHANGE TELEPHONE 1766.

GASEOUS FIRING

FOR LARGE OR SMALL

RETORT-SETTINGS

PLANS, SPECIFICATIONS,

AND ESTIMATES SUBMITTED.

SPECIALTIES

J. & H. ROBUS,

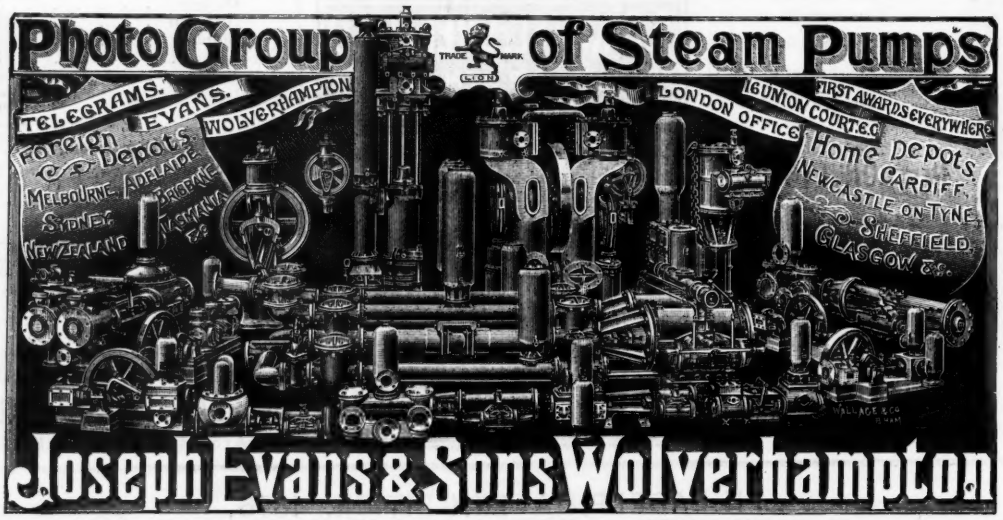
20, BUCKLERSBURY, LONDON, E.C.

ENGINEERS & CONTRACTORS

FOR THE ERECTION OF GAS AND WATER WORKS COMPLETE, AND FOR EXTENSIONS AND RENEWALS.

GAS AND TAR WORKS PUMPS

A SPECIALITY.



WATER-WORKS PLANT

A SPECIALITY.

Apply for No. 8 Catalogue.

ALDER AND MACKAY,

MANUFACTURERS OF

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES OF THE HIGHEST EXCELLENCE.

ORIGINAL MANUFACTURERS OF DRY METERS IN CAST-IRON CASES.

STATION METERS, EXPERIMENTAL METERS, PHOTOMETERS, & PRESSURE-GAUGES, &c.

Results of Tests of Dry Gas-Meters (Section III.) of the Glasgow Philosophical Society's Gas Exhibition, as per London "Gas Journal," May 10, 1881.

	ALDER & MACKAY.		W. & B. COWAN		G. GLENNIE & Co.		JAMES KEITH.		D. B. PEEBLES & Co.
Total of Fast Tests . .	47·2	...	6·9	...	33·6	...	62·3	...	53·7
Total of Slow Tests . .	25·3	...	117·4	...	43·1	...	31·4	...	38·5
	72·5	...	124·3	...	76·7	...	93·7	...	92·2

Descriptive Circulars, Price Lists, and Full Particulars forwarded on application.

NEW GRANGE WORKS, EDINBURGH.

THE SILICA FIRE-BRICK COMPANY,

OUGHTYBRIDGE, NEAR SHEFFIELD.

Established 1858. The First Manufactory of Silica and Dinas Fire-Bricks erected in England.

MANUFACTURERS OF

SILICA FIRE-BRICKS,

(TRADE MARK "SILICA")

Specially adapted for Siemens-Martin Gas-Furnaces; also for Gas, Copper, Iron, Steel, and other Furnaces where intense heat is required.

BESSEMER GANNISTER, STEEL-FURNACE GANNISTER, COPPER-FURNACE GANNISTER, IRONFOUNDERS' CUPOLA SAND FINE-SETTING SILICA CEMENT, STEEL MOULDERS' COMPOSITION.

Our Silica Bricks have gained a high reputation for Unsurpassed Quality in most of the leading Firms in England and on the Continent. Export orders delivered Liverpool, Hull, Grimsby, or the Tyne.

HUTCHINSON BROTHERS,

GAS ENGINEERS, &c.,

MANUFACTURERS OF

Improved Wet & Dry Gas-Meters.

STATION-METERS. LAMP-METERS.

Test Gasholders and General Gas Apparatus.

Brass Main & Lamp Taps. Unions, Ferrules, &c.

The "Falcon" Lamplighter's Torch. Service Cleansers.

SYPHON AND OTHER PUMPS.

WOOD AND WROUGHT-IRON PURIFIER-GRIDS. SCRUBBER BOARDS.

WET AND DRY METERS REPAIRED.

FALCON WORKS, BARNSLEY.

Telegrams: "HUTCHINSON BROS., BARNSLEY."

TO GAS COMPANIES, CORPORATIONS, AND VESTRIES.

IMPROVED STREET LIGHTING,

WITHOUT ADDITIONAL COST,

With THREE to FOUR TIMES the ORDINARY LIGHT,

CAN BE OBTAINED BY

THE INCANDESCENT GAS-LIGHT (Welsbach System),

WHICH HAS NOW BEEN ADAPTED TO

STREET LIGHTING,

And is in use, with great success, in many towns on the Continent.

Send for "Street Lighting" Pamphlet, which gives full particulars, to

THE INCANDESCENT GAS-LIGHT COMPANY,

LIMITED,

14, PALMER STREET, WESTMINSTER, LONDON.

CARLESS, CAPEL & LEONARD,

HOPE CHEMICAL WORKS, HACKNEY WICK, LONDON, N.E.,

NAPHTHA AND GASOLINE DISTILLERS AND PETROLEUM IMPORTERS,

Specially distil Carburine Spirit, specific gravity ·680, or of any other grade suitable for Enriching Gas also Gas Oil best adapted for injecting into the Retorts, as in the Herring Process.

Importers of Petroleum for Carburetting Water Gas, or for Manufacturing Oil Gas. Distillers of Petroleum Ether and Naphtha for clearing the pipes of Naphthalene, &c.

Samples and Prices may be had on application.

OIL GAS

BETTER TERMS CAN BE OBTAINED FROM SUPPLIERS OF OIL IF PURCHASERS HAVE THEIR OWN

TANK-WAGGONS.

HURST, NELSON, & Co., Ltd.,

THE GLASGOW ROLLING STOCK AND PLANT WORKS, MOTHERWELL.

REGISTERED OFFICE:

27, ST. VINCENT PLACE, GLASGOW.

PATENT RIVET COMPANY, LTD., SMETHWICK, NEAR BIRMINGHAM.

Established 1843.

TELEGRAMS: "PRIVET. BIRMINGHAM."

MANUFACTURERS OF

BOLTS & NUTS

FOR

PIPE JOINTS,
FLANGE JOINTS,
RETORT MOUTH-PIECES,
SCRUBBERS,
CONDENSERS,
PURIFIERS,
SIEVES, TANKS,
ENGINES,
BOILERS,
&c., &c.

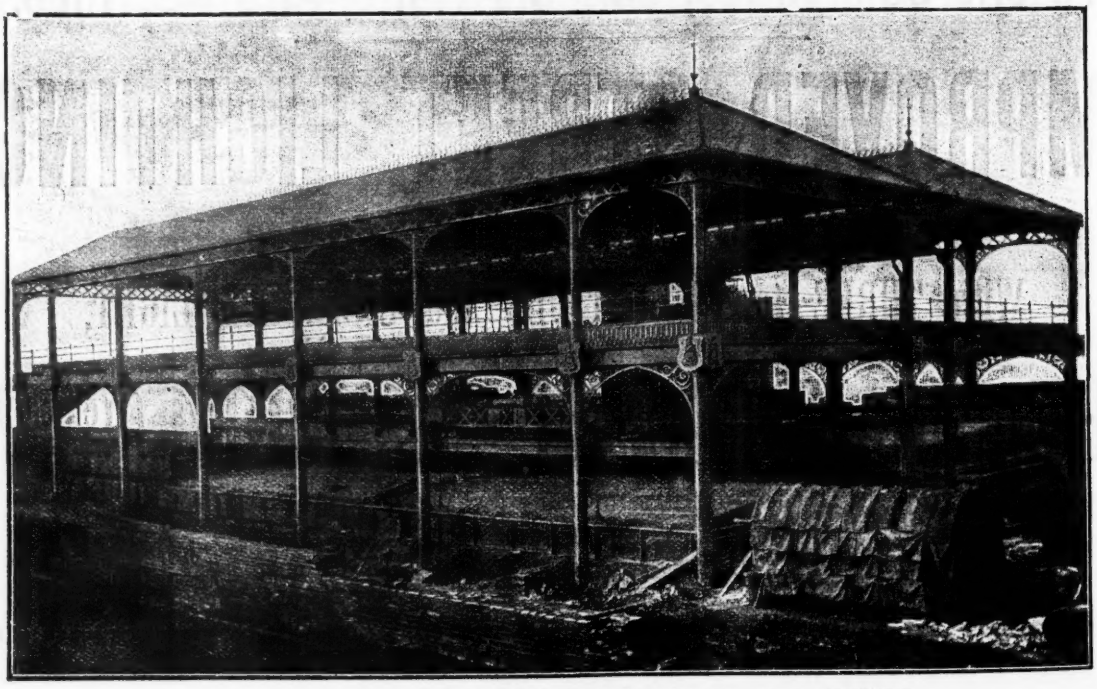
RIVETS

FOR

GASHOLDERS,
BOILERS,
GIRDERS,
TANKS,
COVERS,
&c., &c.; ALSO
SET SCREWS,
WASHERS,
SPIKES,
AND
FISH-PLATE BOLTS

Sole Manufacturers of the "PERFECT" Patent LOCK-NUT and WASHER.

W. C. HOLMES & Co.



Purifier-Houses erected at Huddersfield to designs by Mr. W. R. HERRING.

Makers of Retort Ironwork, Condensers, Patent Scrubber-Washers, Purifiers, Gasholders of all sizes, and Gas Plant and Constructional Ironwork of every description.

Works: HUDDERSFIELD.

Telegrams:
"Holmes, Huddersfield."

London Office:
80, CANNON ST., E.C.
Telegrams: "IGNITOR."

ESTABLISHED 1825.

GAS TUBES

MANUFACTURERS OF EVERY DESCRIPTION OF

IRON OR STEEL LAP-WELDED OR BUTT-WELDED TUBES

FOR ANY PURPOSE.

IMPORTANT TO GAS COMPANIES.

THE MAXIM CARBURETTOR,

FOR ENRICHING GAS IN BULK.

Used for the last Three Years by all the principal London Gas Companies, and since adopted by numerous Suburban and Provincial Companies and Corporations.

THE CARBURETTOR is INEXPENSIVE, EASILY FIXED, and ENTIRELY SUPERSEDES the use of CANNEL COAL.

FOR PRICES AND FULL PARTICULARS, APPLY TO

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

ASHMORE, BENSON, PEASE, & CO., LIMITED,

GAS-WORKS CONTRACTORS, STOCKTON-ON-TEES.

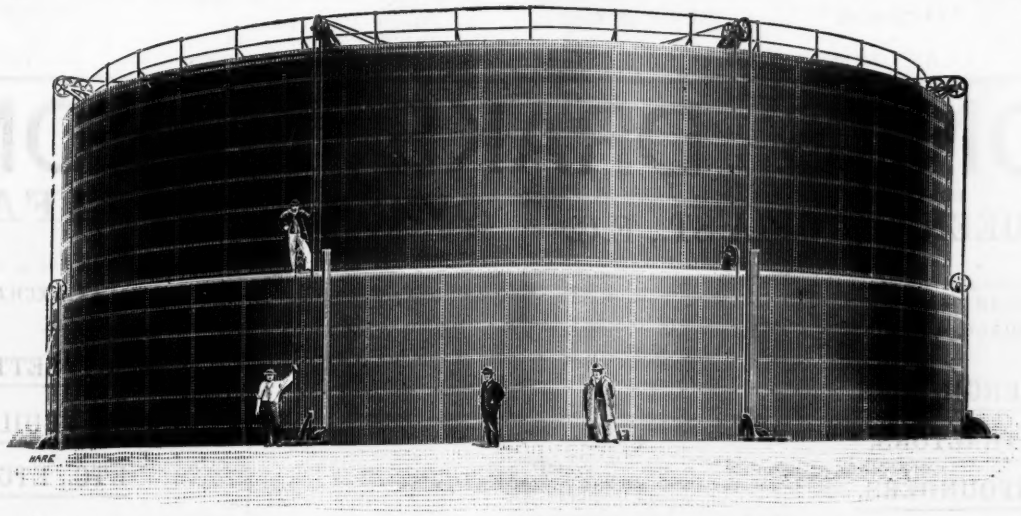


Illustration of BATHURST Holder, 82 feet diameter by 18 feet deep each Lift.

GASHOLDERS ON THE WIRE-ROPE SYSTEM

SUPPLIED TO THE FOLLOWING CORPORATIONS, COMPANIES, AND WORKS AT

MANCHESTER (4 Holders).	HASLINGDEN.	HARROGATE.	BIRKENHEAD.
NOTTINGHAM (4 Holders).	DARLINGTON.	SHEFFIELD.	SLIGO.
BATHURST (AUSTRALIA).	PELTON.	SOUTHBOROUGH.	ST. AUSTELL,
HORSENS (DENMARK).	TYNE DOCK.	DENTON.	AND MANY OTHERS
MILAN (ITALY).	NEWBURN.	ASKE.	IN AMERICA.

LONDON OFFICE: 15 VICTORIA STREET, S.W.

GAS AND WATER PIPES.

Telegraphic Address: "RITCHIE MIDDLESBROUGH."

WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,

WORTLEY FIRE-CLAY WORKS,

Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.

GAS AND WATER PIPES

AND

CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE

CLAY CROSS COMPANY,

CHESTERFIELD.

TRADE	TELEGRAMS:	LONDON AGENTS:
CXC	"JACKSON"	BECK & Co.,
MARK.	CLAY CROSS.	130, GT. SUFFOLK ST., S.E.

GODDARD, MASSEY, & WARNER'S

IMPROVED

Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICE APPLY TO

GODDARD, MASSEY, & WARNER,

ENGINEERS,

NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (Four Apparatus).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited, SHADWELL.
WM. BUTLER & CO., BRISTOL.
KEMPSON & CO., Pye Bridge.

And to the following Gas Companies and Corporations—

ILKESTON.	BURY.	CHORLEY.
WIDNES.	BRIGHOUSE.	WHITEHAVEN.
HALIFAX.	MARKET HARBRO'.	CHESTER.
ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
DENTON.	SOWERBY BRIDGE.	LEEK.
ST. ALBANS.	LEICESTER.	IPSWICH.
DUKINFIELD.	DARWEN.	BOURNEMOUTH.
NORTHWICH.	NELSON.	SALFORD.
HUDDERSFIELD.	ORMSKIRK.	LUTON.
		HAMPTON COURT.

JONAS DRAKE & SON,

LONDON OFFICE:
60, QUEEN VICTORIA ST., E.C.

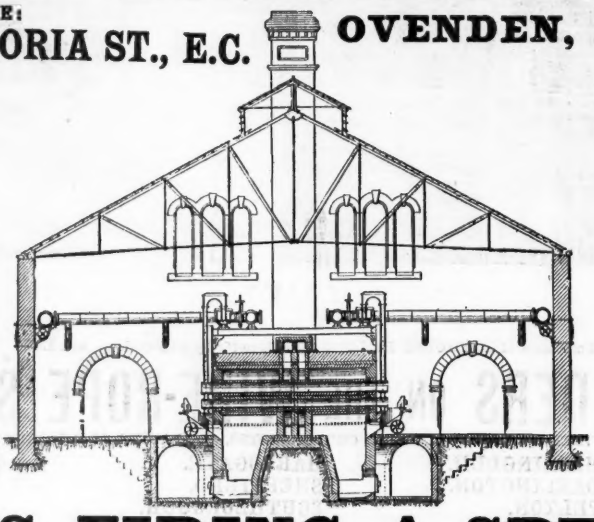
OVENDEN, HALIFAX.

TELEGRAPHIC ADDRESSES:
"DRAKESON, HALIFAX."
"ECLAIRAGE, LONDON."

TELEPHONE No. 43.
HALIFAX EXCHANGE.

GAS ENGINEERS,
CONTRACTORS,
IRONFOUNDERS,

BUILDERS AND ERECTORS OF EVERY DESCRIPTION OF OVENS, BENCHES, KILNS, FURNACES, &c.



RETORT SETTERS,
FURNACE BUILDERS
ETC., ETC.

EGENERATOR AND GENERATOR FURNACES ON DRAKE'S, FRITH'S, SIEMENS'S, KLONNE'S, HASSE'S VALON'S, SOMERVILLE'S, PONSARD'S and other Principles.

INCLINED RETORTS

GASEOUS FIRING A SPECIALTY.

RETORT SETTING IN ALL ITS PRINCIPLES AND BRANCHES. BENCHES FITTED UP COMPLETE.
DRAWINGS SPECIFICATIONS AND ALL OTHER PARTICULARS ON APPLICATION.

HEATHCOTE GAS COAL.

RICH IN ILLUMINATING POWER AND YIELD OF GAS.
ABOVE THE AVERAGE IN WEIGHT AND QUALITY OF COKE.
MAINTAINS A HIGH STANDARD IN RESIDUALS.

THE GRASSMOOR Co., Ld., CHESTERFIELD.

CLAYTON SON & Co LTD

MAKERS OF

WORKS LEEDS

THE LARGEST GASHOLDER IN THE WORLD.

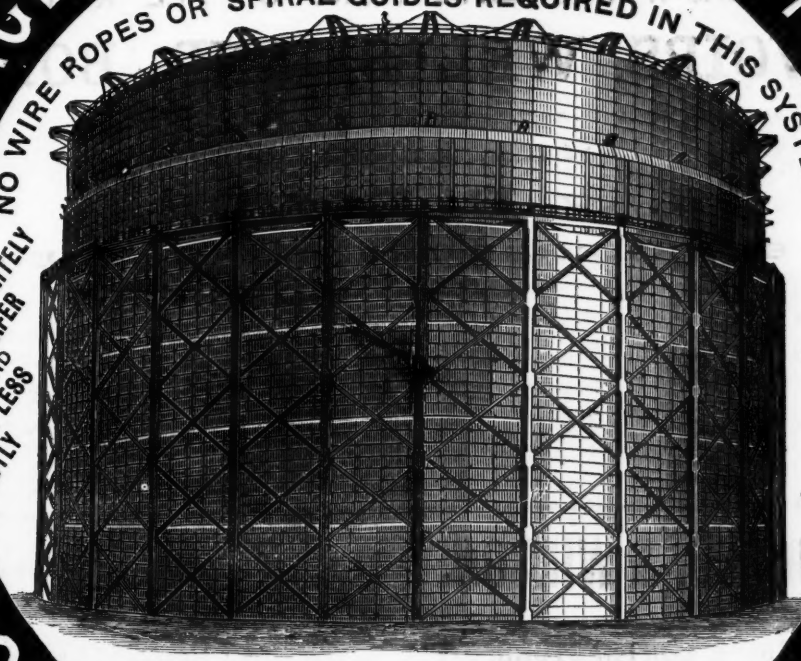
CAPACITY 12 MILLION CUBIC FT.

GASHOLDERS OUR SPECIALITY

NO WIRE ROPES OR SPIRAL GUIDES REQUIRED IN THIS SYSTEM.

INFINITELY SAFER AND FAR LESS COSTLY

THAN ROPES OR SPIRAL GUIDES.



ERECTED AT EAST GREENWICH FOR THE South Metropolitan Gas Company
IT HAS SIX LIFTS 30 FT DEEP EACH AND IS 300 FT DIAR

MAKERS OF GAS PLANT OF EVERY DESCRIPTION

ROOFS PURIFIERS &c. ALSO

ADDRESS LONDON 60, QUEEN VICTORIA ST.
TELEGRAPHIC "GAS, LEEDS.

GASHOLDERS OF ANY SIZE

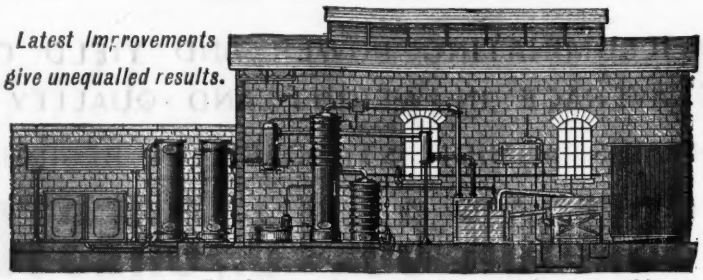
ERECTED & COMPLETED WITHIN 12 MONTHS AND AT THE TIME SPECIFIED

MAURICE SCHWAB, MANCHESTER,

96, DEANSGATE,
GAS ENGINEER.

Sole Licensee of
WILTON'S PATENT
SULPHATE OF
AMMONIA DISCHARGER.
OVER 50 APPARATUS WORKING.

Latest Improvements give unequalled results.



SULPHATE OF AMMONIA
APPARATUS OF THE
MOST MODERN
CONSTRUCTION.
REFERENCES, &c., ON APPLICATION.

Gas-Making Apparatus & General Contract Work, in Cast & Wrought Iron & in Lead, supplied and erected in any part of the United Kingdom.
Before ordering elsewhere, please write for an Estimate.

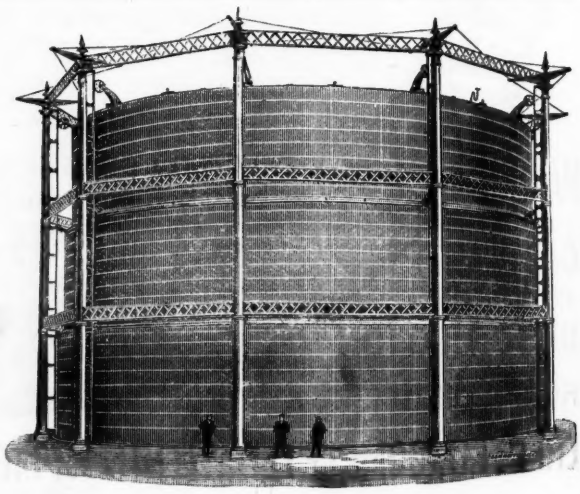
FOR
Gas Holder Tanks
OF ALL SIZES,
AND GAS-WORKS EXTENSIONS OF ALL KINDS,
RESERVOIRS, WELLS, AND BORINGS,
WE SUBMIT ESTIMATES AND ALL PARTICULARS.

J. & H. ROBUS,
20, BUCKLERSBURY, LONDON, E.C.

HANNA, DONALD, & WILSON,
(Established 1851),
GAS ENGINEERS & CONTRACTORS,
Abercorn Foundry and Abbey Works,
PAISLEY, N.B.,
MAKERS OF
Gasholders and Gas Plant
OF EVERY DESCRIPTION.

Sole Agents for Scotland for the Automatic Coal-Gas Retort (Inclined System) Company, Limited.

Telegraphic Address: "Donald Paisley."



ALEX C. HUMPHREYS, M.E. A. G. GLASGOW M.E.

TELEGRAPHIC ADDRESS:
"EPISTOLARY, LONDON."

HUMPHREYS & GLASGOW,

Contracting Engineers for

CARBURETTED WATER GAS PLANT,

9, Victoria Street, London, S.W.

Limp Cloth; Price 2s., free by post.

NEWBIGGING'S TABLES

OF GAS VALUES, DISCOUNTS, DIVIDENDS, AND WEIGHTS AND MEASURES,

FOR USE IN GAS OFFICES.

Price 21s., Post Free,

PRECEDENTS IN PRIVATE BILL LEGISLATION

AFFECTING GAS AND WATER UNDERTAKINGS, 1879-90.

Compiled by E. H. STEVENSON & E. K. BURSTAL.

LONDON: WALTER KING, 11, BOLT COURT, FLEET ST., E.C.

OSLER,

BIRMINGHAM.

MANUFACTURERS OF GASELIERS IN GLASS AND METAL.

The Climax of Regenerative Gas Lighting!!

THE

"VERTMARCHE"

A 280-CANDLE POWER PLAIN IRON LAMP,

CLASS A— 55/-

LIGHT for LIGHT less than half the price of any other Regenerative Lamp.

Manufactured in England.

HENRY GREENE & SONS,

153 & 155, CANNON STREET, LONDON BRIDGE, E.C.

PARTICULARS AND PRICES FREE. AGENTS WANTED

HARPER & MOORES,

STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS, GAS-RETORTS,

LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.

Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.

MANUFACTURERS OF GLASSHOUSE POTS AND CRUCIBLES OF EVERY KIND.

ESTABLISHED 1836.

CROWTHER BROTHERS,

Contractors for the Erection of Gas-Works Complete,

RETORT-SETTINGS, Furnace Building, the Erection of Retort-Benches, &c., &c.

N.B.—Special attention given to the Erection of Inclined Retort-Benches on the Generator and Regenerative Principles complete.

MAIN LAYING IN ALL ITS BRANCHES.

For Terms and Particulars, apply to

CROWTHER BROTHERS,

152, Teviot Street, St. Leonard's Road,

POPLAR, LONDON, E.

Telegraphic Address: "GASRETORT, LONDON."

Experienced Retort Setters and Main Layers sent to all Parts on the Shortest Notice.

ARROL-FOULIS

Patent Automatic Machinery

FOR

DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,

SIR WILLIAM ARROL & CO., Limited,

GLASGOW.

See Illustrated Advertisement, p. II. Centre of JOURNAL for July 3.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND DISTRICT OFFICE: 22, TEMPLE ST., BIRMINGHAM—SOLE AGENT: A. C. SCRIVENER.

TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE No. 200.

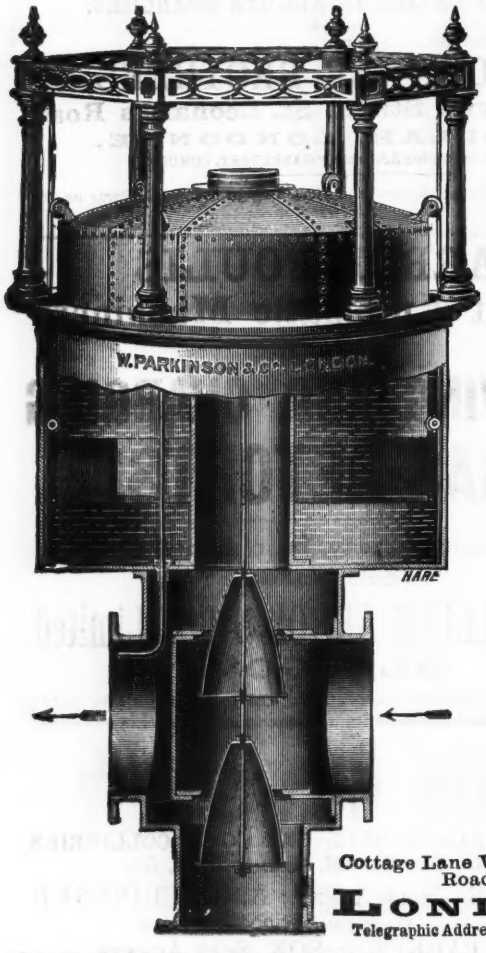
LONDON DISTRICT OFFICE: 6, STRAND, LONDON—C. PARKER & SON, SOLE AGENTS.

TELEGRAPHIC ADDRESS: "PARKER LONDON."

W. PARKINSON & CO.

SQUARE STATION METERS.

All the Meters (which number 14) at theBeckton Station of THE GASLIGHT AND COKE COMPANY have been erected by the above Firm.



PARKINSON'S PATENT EQUILIBRIUM GOVERNORS.

A very large number are now at work; and all Engineers who have adopted them speak in unqualified terms of their great efficiency.

COUNTERBALANCE or AIR VESSEL, as desired.
TWO, FOUR, or SIX COLUMNS and GIRDERS.
WEIGHTS or WATER PRESSURE.

Cottage Lane Works, City Road,
LONDON.
Telegraphic Address: "Index."

Bell Barn Road Works,
BIRMINGHAM.
Telegraphic Address: "Gas-Meters."

10, Mawson's Chambers, Deansgate,
MANCHESTER.
Telegraphic Address: "Precision."

[See Advt. p. 270.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Aug. 7, 1894.